

# HONOURS

in

## Animal & Veterinary Sciences

### 2012



[www.adelaide.edu.au/vetsci/honours/](http://www.adelaide.edu.au/vetsci/honours/)

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If you have any questions, please visit

<http://www.adelaide.edu.au/vetsci/honours/>

## ***School Overview:***

The School of Animal and Veterinary Sciences hosts a range of vibrant research activities on the Roseworthy Campus of the University of Adelaide. The School provides an outstanding environment for research with high quality infrastructure and access to a variety of industry and research facilities. In addition, staff members are internationally recognised for their contributions to scientific and veterinary research.

Research within the School covers a variety of animal groups, including livestock, companion animals, laboratory animals and wildlife. The research interests of the School include areas of animal production and genetics, nutrition, wildlife ecology, laboratory animal science, animal welfare, musculoskeletal biology, epidemiology, physiology and anatomy, microbiology, virology, parasitology, toxicology, immunology and pharmacology as well as the clinical disciplines within veterinary science.

## ***Facilities and training opportunities***

The School of Animal and Veterinary Sciences at the University of Adelaide has a wide range of industry, research and teaching partners. These partnerships will assist students in gaining industry experience and in developing networks and contacts within their areas of chosen specialisation.

Research is conducted on the Roseworthy Campus where a wide range of facilities are available. The labs have advanced scientific instrumentation for analytical research, while the Roseworthy Farm gives access to animal research at the doorstep of the labs and offices.

The Companion Animal Health Centre at the Roseworthy Campus houses a veterinary clinic and hospital, the Veterinary Diagnostic Laboratory (VDL) as well as teaching laboratories and skills suites. Co-location partners on the Roseworthy campus include the South Australian Research and Development Institute (SARDI), the Department of Primary Industries and Resources South Australia (PIRSA), the Pig & Poultry Production Institute, TAFE SA and Martindale Holdings (the Roseworthy farm management). The SARDI Marine Biosecurity Facility is also under development on the campus. Research collaborations are already strong between these groups and the Roseworthy campus is the Animal and Veterinary Sciences hub for South Australian animal-focussed research.

The School is also involved in various Cooperative Research Centres and various academic staff members are involved in other Research Institutes within the University of Adelaide. In addition, the School has developed partnerships with ZoosSA, Equine at Morphettville, and the Institute of Medical and Veterinary Science.

## Quick facts about the School of Animal & Veterinary Sciences

Head of School: Prof Kym Abbott

Honours Co-ordinator: Dr Karen Kind (G17, JS Davies Bldg, Roseworthy)  
Dr Will van Wettere (G03, Corridor Block, Roseworthy)

Campus Location: Roseworthy

### Associated Research Partners

- CRC for Beef Genetic Technologies
- Pork CRC
- Poultry CRC
- Pig and Poultry Production Institute
- South Australian Research & Development Institute (Livestock)
- ZoosSA
- Institute of Medical and Veterinary Science (IVMS)
- Equine at Morphettville
- Sheep CRC
- Gribbles Veterinary Pathology

### Areas of Research Strength

- Animal Nutrition and Physiology
- Molecular & Quantitative Genetics
- Reproductive Physiology
- Skin & Wool Biology
- Anatomy & Structural Biology
- Animal Welfare, Behaviour & Ethics
- Wildlife Ecology
- Veterinary Pathobiology
- Veterinary Population and Public Health
- Production Animal Health

Home Page for School

<http://www.adelaide.edu.au/vetsci/>

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**Honours in School of Animal and Veterinary Sciences**

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***What is Honours?***

An Honours degree in Animal and Veterinary Sciences at the University of Adelaide is the gateway to increased job opportunities and to a range of rewarding careers in research.

Our teaching and research staff are international leaders in their fields. Join us for your Honours project and you will be a member of a research team working at the leading edge of research. You will use state of the art facilities and train with world class researchers in a contemporary learning environment.

Students who reach a sufficient standard of achievement in their undergraduate courses are eligible to apply for admission to this program. Applicants need to have earned a minimum of two credits in level III undergraduate courses relevant to their project. The Honours year consists of a major research project and a series of workshops on various aspects of research throughout the year. The research project is carried out either in a laboratory in the School or in a closely affiliated laboratory. A list of available Honours research projects is advertised on the School's web site. Students who are considering Honours are encouraged to discuss potential research projects with the academics who will supervise these projects.

***What does Honours involve?***

As an Honours student you become a member of the School and a valued colleague. You will spend most of your time as part of a research group sharing goals, triumphs, disappointments and all of the other things that are part of the adventure of research. For the first time, you become responsible for the outcome of your own work. Honours students also partake in all aspects of the academic and social life of the School. You will form friendships and professional associations that could last a lifetime.

***What are the Benefits?***

The Honours degree gives students a thorough training in research methodology and a detailed insight into a specific problem in the area of research that they pursue. The approach to problem-solving, maturity and self-discipline gained during the Honours year equips them for a wide variety of careers. An Honours year also helps to develop your written and verbal communication skills, ability to work independently and as a team member, and analytical thinking, skills that are relevant to all fields of employment. Many of our students also elect to continue in the research domain by enrolling in the School's PhD programs.

***Fields of Research and contacts***

For a list of Fields of Research within the School of Animal & Veterinary Sciences visit:

<http://www.adelaide.edu.au/vetsci/research/>

The **Honours co-ordinators** for the School of Animal & Veterinary Sciences are Karen Kind (phone: 8303 7693; email [karen.kind@adelaide.edu.au](mailto:karen.kind@adelaide.edu.au)) and Will van Wettere (phone: 8303 7911; email [william.vanwettere@adelaide.edu.au](mailto:william.vanwettere@adelaide.edu.au))

## Honours Scholarships – The University of Adelaide

Honours students within the School of Animal & Veterinary Sciences are eligible to apply for a range of scholarships. Each scholarship pays a stipend to the student – this is a tax free amount that is paid directly to you to spend as you wish. Some scholarships also have operating money which is used by your supervisor to support the project.

A list of the more common scholarships is available at <http://www.adelaide.edu.au/vetsci/honours/scholarships.html> and includes:

- School of Animal & Veterinary Sciences Honours Scholarship (Value: \$3000)
- Poultry CRC Honours Scholarship (Value: \$5000)
- Pork CRC Honours Scholarship (Value: \$5000)
- The Ronald J Lienert Memorial Scholarship (Value: \$9000 plus research money)
- RSPCA Australia Alan White Scholarship for Animal Welfare Research (Value: \$7960)
- RSPCA Australia Scholarship for Humane Animal Production Research (Value: \$7960)
- The J.R. Barker Scholarships (Value: \$4000)
- The Commonwealth Hill Honours Scholarship (Value: \$5000)
- Australian Wool Education Trust Fund Scholarship (Value: \$6000 plus research money)

for a complete list of scholarships see  
<http://www.adelaide.edu.au/scholarships/honours/>

Application deadlines for Honours scholarships vary. Some scholarships (eg. Pork CRC) have application deadlines in November-December. We recommend that you familiarise yourself with the scholarship list early in the Honours planning process. Supervisors and the Honours co-ordinator will be able to provide further information as to which scholarships you would be eligible for with your chosen project.

The School of Animal and Veterinary Sciences offers 4-6 scholarships valued at \$3000 each per year. All students who enrol in Honours within the School are eligible for these scholarships. Selection is based on academic merit and there is no application; all students are automatically considered for the School Scholarships. Students who hold other scholarships are not eligible for the School Scholarships.

<b>Aims and Objectives of the Honours Program</b>
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**Aims of the Honours course**

1. To develop the basic skills required for the practice of independent research
2. To promote an appreciation of the methodology and the application of problem solving strategies in research
3. To enhance the competitiveness of our graduates in obtaining appropriate employment

**Objectives for Honours students**

- to demonstrate an original and critical approach in the assimilation of the current state of knowledge in a particular area of research
- to appreciate current gaps in our understanding and the future areas for investigation in a particular area of research
- to demonstrate mastery of the basic techniques required for the study of a research question
- to develop a rigorous and methodical approach to the maintenance of records and the collection, storage and analysis of data
- to develop the capacity to identify and evaluate a problem and define the important elements required for its solution (appreciating the risks and benefits of alternate approaches)
- to communicate information clearly and concisely in written and spoken English

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<b>Course Summary</b>
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During your Honours year, you will be required to undertake the following:

**Research Project – (90% of Final Mark)**

Research Proposal Seminar (formative assessment)

Literature Analysis and Research Proposal - 15%

Supervisors Mark - 10%

Final Seminar - 10%

Thesis - 55%

**Course / Research Proposal on an unrelated topic** component (10% of Final mark) consists of one of the following two options:

A Level III course (3 units value), to be agreed upon by the student, supervisor and the Honours Coordinator

OR

A Literature Review / Research proposal on an unrelated topic (presented as a written literature review / research proposal and seminar)

**Professional Development workshops**

Held throughout the year, covering topics such as Research Management, Written and Oral communication

Further details of the Research Project components you are required to complete during the year are:

### **Research Plan Seminar**

The initial seminar provides an insight into the research question that is the focus of the Honours year. This will include coverage of background information underlying this question, aims and hypotheses, and a description of the methods to be employed. The seminar comprises a 10-12 minute talk and 3-5 minutes for questions. No formal mark is recorded but the presentation is assessed and feedback provided.

### **Literature Analysis and Research Proposal**

The Literature analysis (4000 words) is a critical review of published work related to the project area, to 'set the scene' for the development of the aims/hypotheses addressed by the project. The Research Proposal (1500 words) specifically outlines the project to be conducted, including the experimental design, methods, budget and timeline. This document forms an integral part of project planning in the early stages of the Honours year.

### **Final Seminar**

In the final seminar students present the results of their research project and indicate how their work has contributed to a greater understanding of the research area. This seminar covers the background and aims of the project, the experimental design and techniques used, the analysis, presentation and interpretation of results, and discussion and summary of key findings. The seminar comprises a 20 minute presentation and 10 minutes for questions.

### **Thesis – Final Paper**

Students also present the results of their research project in the form of a written thesis paper. The thesis paper is a 5000 word document prepared in the format of a scientific journal manuscript. Thesis preparation guidelines are provided in the format of those used by a scientific journal. The written presentation of the research project, including interpretation and discussion of the results obtained, contributes 55% of the final mark.

<b>Honours Timetable</b>
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<b>a more detailed timetable will be available at the beginning of each cohort</b>
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<b>Content</b>	<b>February Cohort</b>	<b>July Cohort</b>
Expression of Interest Applications Due (Round 1)	Late October	Early June
Final deadline for application to start Honours	Mid January	Mid July
Research area orientation	Late January	Mid-late July
Workshops	Throughout the year	Throughout the year
OH&S training	February	August
Honours program summary form submitted	March	September
Research Plan Seminar	March	September
Literature analysis & Written Research Plan due	April	October
Written Progress Report	July	January
Final Seminar	October	May
<b>Thesis due</b>	<b>Late October</b>	<b>Late May</b>
Final bound copy of the corrected thesis submitted to the School	Early Dec (1 week before marks due)	Early July (1 week before marks due)

**For Expression of Interest applications, visit:**  
<http://www.sciences.adelaide.edu.au/honours/eoi/>

## How to apply to do Honours

### Find a project and supervisor

Students who are considering Honours within the School should look at the list of prospective projects on offer to see what projects are currently available. If you are having trouble choosing a project, arrange a meeting with the Honours Co-ordinator who will be able to suggest some potential supervisors based on your areas of interest.

When you go to talk with your potential supervisor, you should take a copy of your academic record so that they can determine if you have completed an appropriate range of courses. Students from the University of Adelaide can use an unofficial copy of their record; students from another University will need to provide an official copy of their record.

You should speak with up to 3 potential supervisors before completing the Faculty of Sciences Honours Expression of Interest (Eoi) form.

### Once you have found a project and supervisor

If you are a domestic student (from any University) or an international student who has been studying at the University of Adelaide you will find the Expression of Interest form at <http://www.sciences.adelaide.edu.au/honours/eoi/>. You should complete section 4e, School of Animal and Veterinary Sciences, nominate the 3 preferred supervisors &/or 3 projects and submit the form. The form will be automatically submitted to the Faculty of Sciences office for approval.

Each year there are two cohorts of Honours students: Semester 1 (commencing in February) and Semester 2 (commencing in July). In some cases, the nature of your project may determine which is the best time of year to start. Your potential supervisor can advise you on this.

**Due Dates** for submission of Expression of Interest Forms are listed on the Faculty Honours Information page at <http://www.sciences.adelaide.edu.au/honours/>.

These dates are generally late October (commencing Semester 1) or late June (commencing Semester 2). Offers of admission into Honours are made as soon as possible after 3rd year exam results are finalised (mid December or mid July). Final allocation of projects to students will occur when offers are made.

## RESEARCH AREAS

The School of Animal & Veterinary Sciences is based on the Roseworthy Campus. In addition to the School are a number of co-located research partners. Students undertaking Honours with one of these research partners are still required to complete a School Application form and enrol through the Faculty of Sciences.

The School's research interests include (but are not limited to): animal genetics, animal welfare, behavior & ethics, animal nutrition & physiology, animal anatomy & structural biology, animal reproductive biology, wildlife ecology, and veterinary sciences.

A list of recently completed Honours projects is provided to give you an idea of the types of projects that have been undertaken.

The following pages provide some additional information about the research groups and examples of projects that may be available for 2012. The project list is also available on the web site (listed below) and **new projects may be added to the web site list as they become available**. You should consult both the information in this booklet and the web site list. In addition, if you are interested in a particular area of research you should talk to prospective supervisors or the Honours coordinator to determine whether other opportunities to develop an Honours project may exist.

For the current list of available Honours research projects, please visit:

<http://www.adelaide.edu.au/vetsci/honours/projects.html>

## Anatomy & Physiology

<http://www.adelaide.edu.au/vetsci/research/form/>

The Anatomy and Physiology team has projects available in the areas of animal nutrition, skin and wool biology, gastrointestinal and digestive physiology, comparative anatomy, foetal programming, and comparative gastrointestinal and renal/osmoregulatory physiology.

### **Honours supervisors**

#### **Prof. Phil Hynd**

[philip.hynd@adelaide.edu.au](mailto:philip.hynd@adelaide.edu.au)

Phone: 8303 7871

Research areas: nutritional physiology, ruminant digestive physiology, foetal programming, cutaneous biology, skin and hair growth in mammals

Honours projects:

- Biological defleecing of sheep
- Foetal programming: *in ovo* manipulation of embryonic development
- Is ruminal or plasma valerate an indirect marker of subacute ruminal acidosis?
- Energy expenditure in dogs differing in tendency to obesity
- Short chain volatile fatty acid bolus challenge and pH changes as a marker of adaptation to high energy diets in the sheep

#### **Dr Todd McWhorter**

[todd.mcwhorter@adelaide.edu.au](mailto:todd.mcwhorter@adelaide.edu.au)

Phone: 8303 7896

Research areas: comparative gastrointestinal and renal/osmoregulatory physiology

Honours projects:

- Mechanisms of nutrient absorption in bats
- Digestive performance and enzyme/transporter function in honeyeaters

#### **Assoc. Prof. Gordon Howarth**

[gordon.howarth@adelaide.edu.au](mailto:gordon.howarth@adelaide.edu.au)

Phone: 8303 7885

Research areas: gastrointestinal physiology, the use of naturally-occurring bioactives for protection against gastrointestinal disease

Honours projects:

- Investigating the potential mechanism of Grape Seed Extract: a potential new adjunctive treatment for intestinal disease
- European Mistletoe Extract: a potential new treatment for chemotherapy induced mucositis and inflammatory bowel disease (IBD) (2 projects)
- Effects on mucin dynamics and intestinal cell kinetics induced by probiotic treatments for intestinal mucositis and inflammatory bowel disease
- Influence of chemotherapy-induced mucositis on the gut microbiota

- The Wnt/ $\beta$ -catenin system and regulation of intestinal stem cells in the piglet (*with Assoc. Prof Adrian Cummins, Queen Elizabeth Hospital, Woodville*)

**Dr Rebecca Forder**

[bec.forder@adelaide.edu.au](mailto:bec.forder@adelaide.edu.au)

Phone: 8303 7896

Research areas: gastrointestinal and digestive physiology, the role of gastrointestinal mucins in chicken health and production

Honours projects:

- The development and maintenance of a healthy intestinal environment for improved performance and uniformity of broiler flocks
- Large scale validation trial of the optimal ratio of linoleic acid and  $\alpha$ -linolenic acid in the diet for promoting intestinal and cardiovascular health of broiler chickens
- The role of mucin glycoproteins in *Giardia* pathogenesis
- Lectin histochemistry of goblet cell sugar residues in the small intestine of the chick

**Dr Rachel Norris**

[rachel.norris@adelaide.edu.au](mailto:rachel.norris@adelaide.edu.au)

Phone: 8303 7896

Research areas: comparative anatomy; shape analysis: morphometrics of primates and marsupials; intraspecific variation; skeletal anatomy of vertebrates

Available projects: Students should contact Rachel for information about available projects.

## Pathobiology

<http://www.adelaide.edu.au/vetsci/research/pathobio/>

The Pathobiology team has research projects available in the areas of veterinary microbiology, parasitology, pharmacology and parasitology.

### **Honours supervisors**

#### **Dr Farhid Hemmatzadeh**

[fahrid.hemmatzadeh@adelaide.edu.au](mailto:fahrid.hemmatzadeh@adelaide.edu.au)

Phone: 8303 7723

Research areas: veterinary virology, avian influenza

Honours projects:

- Expression and purification of recombinant PIII protein of M13 bacteriophage and its applications in competitive ELISA for detection of avian influenza virus infections

#### **Dr Darren Trott**

Email: [darren.trott@adelaide.edu.au](mailto:darren.trott@adelaide.edu.au)

Phone: 8303 7989

Research areas: veterinary microbiology

Honours projects:

- A novel antimicrobial for treating multidrug resistant infections (2 projects available)
- Prevalence of MRSA in South Australian horses and equine practitioners/owners
- Preliminary investigation into the hindgut microbiota of koalas
- Non-antimicrobial control of postweaning diarrhoea in pigs

#### **Dr Ryan O'Handley**

[ryan.ohandley@adelaide.edu.au](mailto:ryan.ohandley@adelaide.edu.au)

Phone: 8303 7656

Research areas: veterinary parasitology

Honours projects:

- Reduction of winter scours in sheep through continuous exposure to worm antigens to prevent the development of hypersensitivity.
- Characterisation of the anti-giardial activity of bovine colostrum

#### **Dr Suong Ngo**

[suong.ngo@adelaide.edu.au](mailto:suong.ngo@adelaide.edu.au)

Phone: 8303 0660

Research areas: pharmacology, toxicology, liver metabolism in marsupials

Honours projects:

- Molecular insights into xenobiotic disposition in Australian marsupials
- Appropriate and safe use of Over-The-Counter medications
- Mechanism of herb-drug interaction
- Generic substitution: assessing *in vitro* bioequivalence of multiple generic medicines

## Production Animal Health

[http://www.adelaide.edu.au/vetsci/research/production\\_animal/](http://www.adelaide.edu.au/vetsci/research/production_animal/)

The Production Animal team has research projects available in the areas of ruminant animal health, disease management in aquaculture, reproductive physiology, and reproductive management of intensive livestock.

### **Honours supervisors**

#### **Professor Peter Cockcroft**

[peter.cockcroft@adelaide.edu.au](mailto:peter.cockcroft@adelaide.edu.au)

Phone: 8303 7883

Research areas: Rumen health and production diseases in the transitional ruminant, tools to optimize disease surveillance and monitoring

Honours projects:

- Mobility scoring in dairy cattle
- Short chain volatile fatty acid bolus challenge and pH changes as a marker of adaptation to high energy diets in the sheep

#### **Dr Will van Wettere**

[william.vanwettere@adelaide.edu.au](mailto:william.vanwettere@adelaide.edu.au)

Phone: 8303 7911

Research areas: physical, physiological and endocrinological mechanisms which optimise reproductive efficiency, welfare and productivity in sows

Honours projects:

- Synthetic androstenol: a potential alternative to boar exposure
- Improving welfare of group housed sows: reducing frustration and aggression
- Pre- and post-mating nutritional manipulation: effects on follicle function, oocyte development, potential litter size and sow behaviour/welfare (3 projects)
- Improving piglet performance through increased polyamine ingestion

#### **Assoc Prof Roy Kirkwood**

[roy.kirkwood@adelaide.edu.au](mailto:roy.kirkwood@adelaide.edu.au)

Phone: 8303 7617

Research areas: physical, physiological and endocrinological mechanisms which optimise reproductive efficiency, welfare and productivity in sows

Honours projects:

- Pre- and post-mating nutritional manipulation: effects on follicle function, oocyte development, potential litter size and sow behaviour/welfare (3 projects)

**Dr James Munro**

[james.munro@adelaide.edu.au](mailto:james.munro@adelaide.edu.au)

Phone: 8313 0081

Research areas: disease management in aquaculture

Honours projects:

- Alternative methods for controlling gill and skin fluke in yellowtail kingfish (*with Dr Ian Whittington, SA Museum*)
- Development of bacteriophage therapy in marine hatcheries (*with Dr Lisa Elliott, R&D Manager ProAqua*)
- Antibiotic resistance in bacteria associated with aquarium fish

## Reproduction and Genetics

[http://www.adelaide.edu.au/vetsci/research/repro\\_genetics/](http://www.adelaide.edu.au/vetsci/research/repro_genetics/)

The Production Animal team has research projects available in the areas of ruminant animal health, disease management in aquaculture, reproductive physiology, and reproductive management of intensive livestock.

### **Honours supervisors**

#### **Dr Cindy Bottema**

[cynthia.bottema@adelaide.edu.au](mailto:cynthia.bottema@adelaide.edu.au)

Phone: 8303 7641

Research areas: molecular genetics of livestock

Honours projects:

- Marbling in beef: Turning muscle into fat?
- Animals with willpower: Genes controlling feed intake in cattle
- Comparison of expression of DICKKOPF (DKK-1) by osteoblast like cells from normal and osteoporotic sheep using a human DKK-1 antibody (*with Dr Rena Zarrinkalam, The Adelaide Centre for Spinal Research, IMVS*)
- Osteocytes and canalicular density in vertebral trabecular bone of osteoporotic subjects (*with Dr Rena Zarrinkalam, The Adelaide Centre for Spinal Research, IMVS*)

#### **Assoc Prof Wayne Pitchford**

[wayne.pitchford@adelaide.edu.au](mailto:wayne.pitchford@adelaide.edu.au)

Phone: 8303 7642

Research areas: quantitative genetics and breeding of livestock

Honours projects:

- Maternal productivity of beef cattle
- Maternal productivity of sheep
- Maternal productivity of sows
- Pastoral beef cattle production
- Beef quality in South Australia
- Attitudes of stud beef cattle breeders to BREEDPLAN

#### **Prof Stefan Hiendleder**

Email: [stefan.hiendleder@adelaide.edu.au](mailto:stefan.hiendleder@adelaide.edu.au)

Phone: 8303 7814

Research areas: epigenetics, foetal development

Honours projects:

- Imprinted quantitative trait loci in cattle (several projects)
- Identification and characterisation of imprinted transcripts involved in bovine foetal growth regulation and programming

## Companion Animal Health

[http://www.adelaide.edu.au/vetsci/research/companion\\_animal/](http://www.adelaide.edu.au/vetsci/research/companion_animal/)

### **Dr Anne Peaston**

[anne.peaston@adelaide.edu.au](mailto:anne.peaston@adelaide.edu.au)

Phone: 8313 1926

Research areas: veterinary oncology, transposable element activation in mammary cancer, transposable elements as alternative promoters in early embryogenesis

Honours projects:

- Molecular characterization of canine mast cell tumours

### **Dr Michelle McArthur**

[michelle.mcarthur@adelaide.edu.au](mailto:michelle.mcarthur@adelaide.edu.au)

Phone: 8303 3040

Research areas: human-animal bond

## Veterinary Public & Population Health

[http://www.adelaide.edu.au/vetsci/research/pub\\_pop/](http://www.adelaide.edu.au/vetsci/research/pub_pop/)

### **Honours supervisors**

#### **Prof Michael Reichel**

[michael.reichel@adelaide.edu.au](mailto:michael.reichel@adelaide.edu.au)

Phone: 8303 7882

Research areas: veterinary public health, veterinary diagnostics and pharmaceuticals, veterinary epidemiology

Honours projects:

- Infectious causes of reproductive failure in beef cattle in SA
- *Neospora caninum* infection in greyhounds
- Sheep Health Questionnaire

#### **Dr Susan Hazel**

[susan.hazel@adelaide.edu.au](mailto:susan.hazel@adelaide.edu.au)

Phone: 8303 7828

Research areas: human-animal interactions, animal welfare, behaviour and ethics

Honours projects:

- Behavioural effects of placental restriction, neonatal growth and dietary methyl supplementation
- Puppy preschools in the Adelaide area
- 'Puppy and Up': A study of temperament in puppies and human attachment and how this affects the human-dog bond

#### **Dr Philip Stott**

[philip.stott@adelaide.edu.au](mailto:philip.stott@adelaide.edu.au)

Phone: 8303 7838

Research areas: wildlife ecology and management

Honours projects:

- Thermoregulation in hares
- Grazer impacts on vegetation restoration

#### **Dr Alex Whittaker**

[alexandra.whittaker@adelaide.edu.au](mailto:alexandra.whittaker@adelaide.edu.au)

Phone: 8303 7868

Research areas: animal welfare, laboratory animal science

Honours projects:

- Novel strategies to enhance creep attractiveness & reduce piglet mortality
- Investigation into preputial gland ablation as a method to modify murine pheromones to control aggression in group housed male mice

## Equine Health

<http://www.adelaide.edu.au/vetsci/research/equine/>

Available projects: Students should contact the staff listed below for information about available projects.

**Prof Chris Riley**

[christopher.riley@adelaide.edu.au](mailto:christopher.riley@adelaide.edu.au)

Phone: 8303 7905

**Dr Erik Noschka**

[erik.noschka@adelaide.edu.au](mailto:erik.noschka@adelaide.edu.au)

Phone: 8303 1242

Honours projects:

- Feeling Good, Feeling Bad: Human Expressions on Dog Faces
- Equine Colic Syndrome: Measurement of a new predictor for outcome
- Equine Colic Syndrome: Measurement of Radical Oxygen Species (ROS)
- Other projects involving laminitis and upper airway disease are available on request

**Dr Lidwien Verdegaal**

[lidwien.verdegaal@adelaide.edu.au](mailto:lidwien.verdegaal@adelaide.edu.au)

Phone: 8303 1290

Honours projects:

- Electrolyte supplementation and clinical & telemetry-ECG examination in endurance horses during competition
- Continuous telemetric monitoring of body temperature in exercising endurance horses

## Projects with our collaborators

The School of Animal & Veterinary Sciences has a variety of collaborators from various areas both within and outside of the University of Adelaide. Below are some of the projects available to students.

### **Honours supervisors**

#### **Dr Forbes Brien (SARDI)**

[brien.forbes@sa.gov.au](mailto:brien.forbes@sa.gov.au)

Honours projects:

- An investigation of causes of lamb loss in sheep

#### **Dr Paul Hughes (Pork CRC)**

[paul.hughes@sa.gov.au](mailto:paul.hughes@sa.gov.au)

Honours projects:

- Reducing stillbirths and early post-natal mortality in pigs

#### **Dr Bob Hughes (PPPI)**

[bob.hughes@sa.gov.au](mailto:bob.hughes@sa.gov.au)

Honours projects:

- Poultry nutrition
- Poultry digestive physiology

#### **Dr Kathy Gatford**

[kathy.gatford@adelaide.edu.au](mailto:kathy.gatford@adelaide.edu.au)

Honours projects:

- Immune function after placental restriction and dietary methyl supplementation
- Epigenetic consequences of placental restriction and dietary methyl supplementation

#### **Dr Jeremy Thompson**

[Jeremy.thompson@adelaide.edu.au](mailto:Jeremy.thompson@adelaide.edu.au)

Honours projects:

- Is the oviduct an oxygen sensitive organ?
- Do specific oocyte-secreted proteins alter the metabolism of their surrounding cumulus cells?

#### **Dr Mel McDowell**

c/- [karen.kind@adelaide.edu.au](mailto:karen.kind@adelaide.edu.au)

Honours projects:

- The influence of hyperglycaemia during the periconception period on pig oocyte development
- Glucosamine supplementation and the oocyte

**Dr Robert Gilchrist**[robert.gilchrist@adelaide.edu.au](mailto:robert.gilchrist@adelaide.edu.au)

Honours projects:

- Understanding the functioning of oocyte-derived growth factors

**Dr Pieter Langendijk (SARDI)**[pieter.langendijk@sa.gov.au](mailto:pieter.langendijk@sa.gov.au)

Honours projects:

- Social learning in piglets as a way of stimulating feed intake
- Hormonal and nutritional regulation of ovarian function in pregnant pigs
- Embryo survival during early pregnancy in pigs
- Herbal ingredients in pig diets as stimulators of milk production

**Dr Reza Zarrinkalam (IMVS)**c/- [cynthia.bottema@adelaide.edu.au](mailto:cynthia.bottema@adelaide.edu.au)

Honours projects:

- Osteocytes and bone mineral density in trabecular bone of osteoporotic sheep

## **Projects with the Anatomy and Physiology Team**

### **Biological defleecing of sheep**

**Principal Supervisor: Prof Phil Hynd**

The cost of harvesting wool is 35% of the total cost of wool production and this makes wool expensive and uncompetitive, and shearing is an OHS nightmare. By comparison all other commodities have a harvesting cost of less than 12% of total costs. Attempts have been made to shear sheep using robots or chemical defleecing agents. A commercial defleecing agent has been commercialised (Bioclip) but it is not widely adopted because it causes a complete break in the wool requiring application of a body-net to catch the severed wool. We have devised a treatment which creates a weakened zone in the fleece allowing defleecing using novel mechanical means (ultrasound, air blasts, flailing rubber fingers etc). This project will test the efficacy of a new defleecing agent as a prelude to commercial development.

Techniques:

- Working with sheep with jugular catheters, infusion of the test compound
- Assessment of the efficacy of the treatment on wool growth (diameter, staple strength)

Scholarships you may be eligible for with this project:

- JR Barker
- Commonwealth Hill
- AWET fund

### **Foetal programming: *in ovo* manipulation of embryonic development**

**Principal Supervisor: Prof Phil Hynd**

Co-supervisor: Dr Karen Kind

Recent studies have shown that lifelong health of humans depends not only on genetics and postnatal lifestyle but also on the environment that existed *in utero*. That is the maternal environment during tissue development appears to set an animal up for predisposition to various metabolic diseases. Animal scientists are now interested in using this knowledge to improve the health and production of animals. However it is difficult to manipulate the environment of mammals because it is difficult to apply treatments that will cross the placenta and reliably affect the foetus. Birds, on the other hand provide a great model for such studies because the embryo develops outside the mother (in the egg). We aim to inject eggs at different stages of development with targeted therapeutic nutrients to alter the development of the embryo and to then examine the effects of these interventions on the lifetime health and productivity of the resulting chickens. This research is important because if we can prove the model works it will become a means of testing the effects of various nutrients on embryo development, which has implications for the diets of pregnant women. It may also provide a method for the chicken industry to improve the health and production of chickens.

### **Is ruminal or plasma valerate an indirect marker of subacute ruminal acidosis?**

**Principal Supervisor: Prof Phil Hynd**

Co-supervisor: Prof Peter Cockcroft

Subacute ruminal acidosis is a serious economic and welfare disease of ruminants on diets high in soluble carbohydrates. By definition the disease is difficult to detect, resulting in a high proportion (25%) of animals at any time point suffering the syndrome. There is some evidence that the propensity to SARA has a genetic component (ie the repeatability of response to inductive diets is high). If we had a phenotypic marker for the disease we might therefore be able to develop an Estimated Breeding Value for SARA-predisposition. We have noted that some sheep on a 'SARA-inducing diet' had relatively high levels of the C5 short-chain fatty acid, (valerate) in the rumen fluid. This is unusual and may indicate that ruminal valerate is a feature of SARA-susceptible animals. This project will explore this possibility, and further, examine the possibility that a simple blood test for valeric acid might be a useful marker to identify SARA-susceptible animals. This would represent a very significant breakthrough which would allow us to generate EBV's for SARA-susceptibility and select animals that perform better in feedlots. In the first part of the project you will examine data from a previous Honours student's experiment to determine if there is any relationship between ruminal valerate and pH changes measured using indwelling pH loggers (this will involve some detailed statistical analysis

using models that account for other relationships between other VFA and pH). You will then work with a PhD student, who is running a feeding trial in which fistulated sheep will be offered a SARA-diet. You will take blood samples by venepuncture, and urine samples by total collection, to determine if there is any relationship between ruminal pH, ruminal valerate concentration, plasma valerate concentration, blood pH, urine pH, feed intake, behaviour and liveweight change.

Scholarships you may be eligible for with this project:

- JR Barker
- Commonwealth Hill
- AWET fund

### **Short chain volatile fatty acid oral bolus challenge and pH changes as a marker of adaptation to high energy diets in the sheep**

**Principal Supervisor: Prof Phil Hynd**

Co-supervisor: Prof Peter Cockcroft

Transitional ruminants switch from diets with a low energy density to a diet with a high energy density. Examples include beef cattle and lambs entering the feedlot and periparturient dairy cows. Many problems arise from the failure of adaptation resulting in reduced productivity, health and welfare. Poor adaptation has a major economic impact on animal production

The failure of adaptation is characterised by sub-acute acidosis (SARA) and acute ruminal acidosis (ARA). Sub-acute ruminal acidosis (SARA) is characterised by the accumulation of short chain fatty acids SCVFAs in the rumen with a persistent reduction in the rumen pH within the range 5.2-5.7. Acute ruminal acidosis is characterised by accumulations of lactic acid in the rumen and a persistent rumen pH <5.0. These changes are illustrated in Figure 1.

The process of rumen adaptation and the phenotypic variation between individuals with regards to the risk of SARA are poorly understood. This study will investigate the following hypotheses:

- Following a challenge with a standard SCVFA load the pH in high energy adapted animals will return to >5.7 more rapidly than low energy adapted animals.
- Following a challenge with a standard SCVFA load the pH in high energy adapted (non-SARA) animals will return to >5.7 more rapidly than animals in high energy adapted (SARA) animals.

### **Energy expenditure in dogs differing in tendency to obesity**

**Principal Supervisor: Prof Phil Hynd**

**Co-Supervisor: Dr Susan Hazel**

There are large differences between animals (including humans) in their intake and metabolism of energy. Dogs are particularly variable in their appetite, voluntary intake and propensity to obesity (eg greyhounds vs Labradors). We have recently (in an Honour's project) made the interesting finding that dogs with a tendency to obesity (Labradors, retrievers) have lower core body temperatures (and possibly more variable temperatures) than those breeds less prone to obesity (Greyhounds). This project will explore this finding further using larger numbers of dogs and more detailed analysis of diet, condition scores and activity levels.

Techniques:

- Dog handling, use of temperature loggers
- Interaction with owners and communication of the science behind the project
- Statistical analysis of complex data sets to define patterns of response variables
- This project may attract funding from the Cat and Dog Management Board

### **Mechanisms of nutrient absorption in bats**

**Principal Supervisor: Todd McWhorter**

Recent research into mechanisms of water soluble nutrient absorption in vertebrates has revealed some interesting patterns. Small flying vertebrates (birds and bats), for example, exhibit relatively higher reliance on non-carrier mediated (paracellular) nutrient uptake than other groups of vertebrates,

possibly as compensation for their generally shorter and lighter guts (Caviedes-Vidal et al., 2008; Caviedes-Vidal et al., 2007; Tracy et al., 2007). Paracellular nutrient uptake can provide additional capacity for nutrient absorption that is energy efficient and does not saturate like carrier-mediated mechanisms of absorption. Because it is not specific and is associated with relatively higher intestinal permeability, it does however come with increased risk of systemic exposure to water soluble toxins found in animal diets.

This project is part of a collaborative U.S. National Science Foundation funded project to explore patterns in and mechanisms of nutrient absorption in small flying mammals (i.e. bats). It will include both in vivo measurements of nutrient absorption in bats using pharmacokinetic techniques, and studies of the function and expression of nutrient transporter proteins and tight junction proteins (important in forming the epithelial barrier). Similar projects on mechanisms of nutrient absorption (both carrier-mediated and paracellular) can also be developed in other animal models.

### **Digestive performance and enzyme/transporter function**

#### **Principal Supervisor: Todd McWhorter**

Activities of specific digestive enzymes often show a correlation with the presence or absence of their substrates in the diet. Disaccharidase activities, for example, appear to be broadly related to diet. Nectar-feeding passerine birds and hummingbirds feed on sucrose rich diets, and show much higher activity of the membrane-bound disaccharidase sucrase-isomaltase than other groups of birds. It's unclear whether patterns in digestive performance in these birds are a consequence of functional changes in proteins (e.g. adaptation in substrate affinity), changes in level of gene expression of highly conserved proteins, or both. This project will explore the relationship between levels of enzyme activity, substrate affinity, and enzyme protein gene expression, using nectar-feeding Australasian honeyeaters as a model. Similar projects relating digestive performance and/or plasticity to gut morphology and/or function or expression of digestive enzymes and nutrient transporters can also be developed in other animal models.

### **Investigating the potential mechanism of Grape Seed Extract: a potential new adjunctive treatment for intestinal disease**

#### **Principal Supervisor: A. Prof Gordon Howarth**

Co-supervisors: Dr Susan Bastian (School of Agriculture, Food & Wine) and Dr Rebecca Forder

Inflammatory bowel disease (IBD) is a serious idiopathic and, so-far, incurable condition affecting approximately 1 in 8000 individuals in Australia. It comprises two variants, ulcerative colitis and Crohn's disease. The histopathological features of Crohn's disease are similar to Johne's disease, a debilitating condition that affects livestock. On the other hand, intestinal mucositis (IM), which often manifests in cancer patients undergoing chemotherapy, affects primarily the small intestine. Current therapies for IBD and IM attempt to reduce inflammation and injury to the bowel but these are often ineffective.

Grape Seed Extract, derived from grapes utilized in the wine-making industry, is a rich source of procyanidins with anti-oxidant activity. There have been relatively few rigorously-conducted scientific studies to underpin its use health-related purposes. In a previous Honours project (Cheah et al; 2009) we have identified indications that GSE may be protecting the small intestine from injury, and we are currently investigating its potential to treat disorders of the large bowel. The current study will investigate a potential mechanism of action for GSE by determining its effects on intestinal mucins and cell kinetics of the intestinal enterocytes (cells that line the intestine).

#### **Techniques to be used**

GSE treated gastrointestinal tissues collected from rats with experimentally-induced IBD and IM will be subjected to mucin staining and subsequent localisation and quantification. Different types of mucin will be determined and correlated with histological parameters (villus height/crypt depth) and enterocyte kinetics (proliferation/apoptosis) using immunohistochemistry. Some small animal handling will be involved.

#### **Reference**

KY Cheah, GS Howarth et al. An extract from grape seed improves parameters of small intestinal mucositis in rats with mucositis induced by 5-Fluorouracil. *Cancer Biol Ther.*8(4):382-390 (2009).

**European Mistletoe Extract: a potential new treatment for chemotherapy induced mucositis and inflammatory bowel disease (IBD) (2 projects)****Principal Supervisor: Associate Professor Gordon Howarth**

Co-supervisor: Dr Luby Simson (University of Canberra)

- 1) Intestinal mucositis (IM) commonly manifests in cancer patients undergoing chemotherapy. It is a serious disorder primarily affecting the small intestine that may prove fatal. Current therapies for intestinal mucositis attempt to reduce inflammation and injury to the bowel but these are often ineffective. There is a need to develop new agents to treat, or prevent, this condition.
- 2) Inflammatory bowel disease (IBD) is a serious idiopathic and, so-far, incurable condition affecting approximately 1 in 8000 individuals in Australia. It comprises two variants, ulcerative colitis and Crohn's disease. The histopathological features of Crohn's disease are similar to Johne's disease, a debilitating condition that affects livestock. Current therapies for IBD attempt to reduce inflammation and injury to the bowel but these are often ineffective.

Recently, researchers have focussed on the potential for certain 'anti-oxidant' plant-sourced extracts to decrease the severity of inflammation in a range of bowel disorders. However, to date, there have been few studies in the setting of IM or IBD. Standardized European Mistletoe (*Viscum album*) has been used for more than 80 years as an anti-cancer medication. Its therapeutic use has tended to be greatest in European countries such as Germany. Indeed, oncology out-patient clinics in Germany describe Mistletoe Extract as their most frequently prescribed product, with 40% of cancer patients receiving Mistletoe extract during the course of their treatment regimen. Moreover, Mistletoe Extract has been reported to possess antitumour activities *in vitro*. To date, however, there have been few reports of Mistletoe Extract being subjected to rigorous scientific scrutiny in proven, fully-characterized models of intestinal disease. Two projects are available, utilizing proven animal models of 1) intestinal mucositis and 2) inflammatory bowel disease that will aim to identify extracts of Mistletoe with the ability to combat intestinal disease.

**Techniques to be used**

European Mistletoe Extract will be administered to rats with experimentally-induced intestinal mucositis or IBD. Efficacy of Mistletoe Extract will be sought by investigating effects on whole body metabolism, digestive function, biochemical analysis of gut tissues and qualitative and quantitative histological analysis of intestinal tissue samples. In selected samples, different types of mucin will be determined and correlated with histological parameters (villus height/crypt depth) and enterocyte kinetics (proliferation/apoptosis) using immunohistochemistry.

**Effects on mucin dynamics and intestinal cell kinetics induced by probiotic treatments for intestinal mucositis and inflammatory bowel disease****Principal Supervisor: Associate Professor Gordon Howarth**

Co-supervisor: Dr Rebecca Forder

Probiotics (health-promoting bacteria) are being used widely to improve intestinal health. In previous studies, certain probiotic species have shown therapeutic benefit (Tooley et al 2006; Geier et al 2007) against small and large intestinal injury, respectively, although the mechanism underlying this effect remains undefined. The current study will seek to define a potential mechanism of action for these probiotics by determining their effects on intestinal mucins and cell kinetics of the intestinal enterocytes (cells that line the intestine).

Inflammatory bowel disease (IBD) is a serious idiopathic and, so-far, incurable condition affecting approximately 1 in 8000 individuals in Australia. It comprises two variants, ulcerative colitis and Crohn's disease. The histopathological features of Crohn's disease are similar to Johne's disease, a debilitating condition that affects livestock. Intestinal mucositis (IM), however, commonly manifests in cancer patients undergoing chemotherapy. It affects primarily the small intestine. Current therapies for IBD and IM attempt to reduce inflammation and injury to the bowel but these are often ineffective.

**Techniques to be used**

Probiotic treated gastrointestinal tissues collected from rats with experimentally induced IBD and IM will be subjected to mucin staining and subsequent localisation and quantification. Different types of mucin will be determined and correlated with histological parameters (villus height/crypt depth) and

enterocyte kinetics (proliferation/apoptosis) using immunohistochemistry. Some small animal handling will be involved.

#### References

KL Tooley, GS Howarth, GP Davidson and RN Butler. Oral ingestion of *Streptococcus thermophilus* diminishes severity of small intestinal mucositis in methotrexate treated rats. *Cancer Biol Therap.* 5(6): 593-600 (2006).  
MS Geier, RN Butler, PM Giffard and GS Howarth. *Lactobacillus fermentum* BR11, a potential new probiotic, alleviates symptoms of colitis induced by dextran sulfate sodium (DSS) in rats. *Int J Food Micro* 114(3):267-274 (2007).

### **Influence of chemotherapy-induced mucositis on the gut microbiota.**

**Contact: Associate Professor Gordon Howarth**

Co-supervisor: Dr Valeria Torok (South Australian Research and Development Institute)

Intestinal mucositis commonly manifests in cancer patients undergoing chemotherapy. It is a serious disorder primarily affecting the small intestine and may prove fatal. Current therapies for intestinal mucositis attempt to reduce inflammation and injury to the bowel. However, these are often ineffective. An optimal gut microbiota is essential to the health and well-being of the host and can impact on the host's gut physiology and immunology. Modifying the gut microbiota by probiotic treatment has been shown to have some therapeutic treatment against chemotherapy induced mucositis in preliminary studies (1). However, a detailed knowledge of the change in the microbiota induced by mucositis remains unclear. This knowledge is important if we are to develop new agents able to treat, or prevent, this condition. The primary study aim is to investigate differences in the commensal gut microbiota in an animal model of chemotherapy-induced mucositis. The faecal microbial communities of healthy rats and rats with mucositis will be investigated to determine the changes in the gut microbiota resulting from chemotherapy-induced mucositis.

#### Techniques to be used:

Terminal restriction fragment length polymorphism (T-RFLP) (2) will be used to investigate bacterial communities in the gut tissues and faeces of healthy rats compared to rats with chemotherapy-induced mucositis. This culture independent technique enables the overall bacterial population to be investigated without prior knowledge of the bacterial species present. If overall changes in bacterial populations are detected, then *in-silico* techniques will be used to potentially identify bacterial species of interest.

#### References

Tooley KL, Howarth GS, Davidson GP, Butler RN. 2006. Oral ingestion of *Streptococcus thermophilus* diminishes severity of small intestinal mucositis in methotrexate treated rats. *Cancer Biol. Therap.* 5(6): 593-600.  
Torok VA, Ophel-Keller K, Loo M, Hughes RJ. 2008. Application of methods for identifying broiler chicken gut bacterial species linked with increased energy metabolism. *Appl. Environ. Microbiol.* 74:783-791.

### **The Wnt/ $\beta$ -catenin system and regulation of intestinal stem cells in the piglet**

**Contact: Associate Professor Adrian Cummins, [adrian.cummins@health.sa.gov.au](mailto:adrian.cummins@health.sa.gov.au)**

Co-supervisors: Associate Professor Gordon Howarth, Dr William Van Wettere

Studies of growth and development of the small intestine often use rodents but they have delayed development (predominantly postnatally) compared with humans. The pig is a better model to study intestinal growth. The Wnt/ $\beta$ -catenin system is thought to regulate intestinal stem cells and therefore intestinal growth. Activation of the pathway is shown by nuclear expression of  $\beta$ -catenin in stem cells but this is also present in adjacent Paneth cells in intestinal crypts. There are 19 Wnts in mammals but we do not know which are present in the small intestine of pigs at this age. The aims of this project are to investigate activation of the Wnt/ $\beta$ -catenin pathway in intestinal crypts and to identify which Wnts are present that could promote intestinal growth and development. The significance is that these could be administered (eg, by nanoparticle transfection) to augment growth in both humans medically (eg, to treat short bowel syndrome) and agriculturally for improved efficiency of pork production.

#### Techniques to be used:

Dual and triple immunostaining for nuclear  $\beta$ -catenin in intestinal crypt cells for lysozyme to identify Paneth cells and for OLFM4 or DCAMKL-1 stem cell markers will be undertaken. The proportion of activated stem cells expressing only nuclear  $\beta$ -catenin will be counted compared to the total stem

cells. Wnt expression will be assessed by real time PCR and localisation undertaken by laser dissection microscopy and by immunostaining.

Reference:

Camac KS, Thompson FM, Cummins AG. Activation of b-catenin in the stem cell region of crypts during growth of the small intestine in infant rats. *Dig Dis Sci* 2007;52:1242-6.

May R, Sureban SM, Hoang N *et al.* DCAMKL-1 and LGR5 mark quiescent and cycling intestinal stem cells respectively. *Stem Cells* 2009;27:2571-9.

### **The development and maintenance of a healthy intestinal environment for improved performance and uniformity of broiler flocks**

**Principal Supervisor: Rebecca Forder**

Co-supervisor: Mark Geier (SARDI PPPI), [mark.geier@sa.gov.au](mailto:mark.geier@sa.gov.au)

In a production environment, the growth of individual broiler chickens can be quite variable. Whilst it is clearly evident that there is substantial variation in broiler performance within a flock, few studies have attempted to understand the key microbial and gut factors underlying such variation.

This project is part of a larger project to investigate microbial and gut-related factors linked to variable bird performance, with the overall aim to identify nutritional and probiotic additives that help to produce consistently high performing birds. This project will focus on assessment of the relationship between intestinal morphology and bird performance, with the results to be linked back to intestinal gene expression and microbial profiling data in order to understand how different microbial environments influence host intestinal structure and function.

Scholarships you may be eligible for with this project:

- Poultry CRC

### **Large scale validation trial of the optimal ratio of linoleic acid and $\alpha$ -linolenic acid in the diet for promoting intestinal and cardiovascular health of broiler chickens**

**Principal Supervisor: Rebecca Forder**

Co-supervisor: Mark Geier, (SARDI PPPI), [mark.geier@sa.gov.au](mailto:mark.geier@sa.gov.au)

Preliminary data have shown that chickens fed on the low linoleic acid (LA): alpha-linolenic acid (ALA) diets have elevated levels of eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA) in their heart muscle. Extrapolating from extensive research carried out on rats and humans, we believe this is likely to result in better cardiovascular health, immune function and bone development for chickens throughout the grow out phase and during harvest processes (handling, transport, slaughter) that could reduce mortality, and improve carcass quality and overall chicken welfare. The purpose of the larger study is to determine whether use of a diet low in linoleic acid (LA) relative to alpha-linolenic acid (ALA), but nutritionally adequate in all other respects, can produce increased levels of beneficial long chain omega 3 polyunsaturated fatty acids (LC n3 PUFA) in chicken cardiac and intestinal tissue to improve chicken health and welfare, without detriment to growth rate and feed conversion. The specific focus of this research project is to characterise the effect of altered n3 PUFA status on cardiac and gastrointestinal tissue morphology.

Scholarships you may be eligible for with this project:

- Poultry CRC

### **The role of mucin glycoproteins in *Giardia* pathogenesis**

**Principal Supervisor: Dr Rebecca Forder**

Co-supervisor: Dr Ryan O'Handley

*Giardia duodenalis* (syn *G. lamblia*, *G. intestinalis*) is the third most common cause of infectious gastrointestinal disease in Australia and is the most common intestinal parasite in the developed world. Although the current prevalence of giardiasis in the developing world is not known, previous estimates by the WHO indicate over 200 million people have symptomatic diseases, termed giardiasis, with 500,000 new cases occurring annually (WHO, 1996). Children are most commonly infected by *Giardia* and those living in poor and disadvantaged communities both in the developed and developing world are most at risk of chronic nutritional disorders and failure to thrive associated with the infection (Savioli, 2006). It is due mainly to the impacts of the parasite on child health that the WHO included

*Giardia* in the neglected diseases initiative in 2004. Although a common cause of disease in the developed and developing world, the pathogenesis of giardiasis is only just being resolved. The main pathologic changes following infection lead to a malabsorptive syndrome which may culminate in diarrhoea. However, it is not understood how *Giardia* is able to circumvent or interact with the innate barrier mechanisms in the small intestine and gain access to the epithelial surface.

An area that is receiving much attention of late is the role of the mucus layer in innate barrier function. The first line of defense micro-organisms encounter when trying to traverse the intestinal mucosa is the overlying mucus-gel layer. Increasing interest has been directed toward the protective properties of mucin as a barrier against epithelial attachment, and the mechanisms by which pathogens can utilise these mucin glycoproteins to facilitate adhesion and colonisation. *Giardia* has previously been observed to bind to intestinal mucus which facilitated growth and adhesion to glass slides *in vitro*. It has also been reported that infection of the jejunum with *Giardia* resulted in greater goblet cell number and mucin secretion compared to controls. However these findings are based on small sample size studies with little attention directed at determining the mechanisms of attachment and utilisation of the mucus layer and intestinal epithelium in initiating infection. Thus the aim of this study is to investigate the interaction between the intestinal mucus layer and *Giardia* and the possible involvement of mucin glycoprotein in the pathogenesis of *Giardia* infection.

#### Methods

A mouse infection model of giardiasis will be utilised for this study. Intestinal samples will be collected from infected and control mice. Histological comparisons and comparisons in mucin composition between infected and control mice will be used to determine the role of mucins in the pathogenesis of giardiasis.

### **Lectin histochemistry of goblet cell sugar residues in the small intestine of the chick.**

#### **Principal Supervisor: Dr Rebecca Forder**

**Aim:** To optimize lectin histochemical techniques to assess terminal and sub-terminal sugar profiles in small intestinal goblet cells during early post-hatch development of low bacterial load and conventionally reared chicks.

Mucins, synthesised and secreted by goblet cells, possess potential binding sites for both commensal and pathogenic organisms, and may perform a defensive role during establishment of the intestinal barrier in newly hatched chickens. Increasing interest has been directed toward bacterial interactions within the mucus layer, and the mechanisms by which bacterial colonisation can influence mucus composition during early development. This is important, firstly, as a means to understand their involvement in the pathogenesis of intestinal diseases and secondly, to utilise and optimise their protective properties for enhanced gut function. Currently, information on mucin-bacterial interactions in poultry is limited. In order to observe the effects of bacterial exposure on intestinal goblet cell mucin production during early development, differences in the small intestine of conventionally-reared and low bacterial load broiler chicks were examined during the first 7 days post-hatch. Using histological staining techniques to distinguish between mucin types, it was found that total goblet cell numbers and morphology of goblet cells showed significant differences in acidic mucin composition at d 3-4 post-hatch, in conventionally reared chicks. Although it was observed that the overall acidic mucin profile was affected in response to colonizing bacteria, it is of interest to identify specific terminal and sub-terminal sugars of mucin glycoproteins, which are important in regards to potential attachment sites for pathogenic bacterial species.

This proposed project will utilise intestinal tissues previously collected from chickens (0-7d) incubated, hatched and reared in a bacterial-free environment as a means to compare and observe bacterial interactions with the intestinal mucosa to those of chickens exposed to conventional rearing conditions. Previously embedded jejunal and ileal samples will be serially sectioned and incubated with a series of selected enzyme-conjugated lectins. These will then be viewed using light microscopy and quantified using image analysis software.

Scholarships you may be eligible for with this project:

- Poultry CRC

## **Projects with the Pathobiology Team**

### **Expression and purification of recombinant PIII protein of M13 bacteriophage and its applications in competitive ELISA for detection of avian influenza virus infections.**

**Principal Supervisor: Dr Farhid Hemmatzadeh**

Highly pathogenic avian influenza (AI) is a major respiratory disease that affects both animal and human. In both human and animal cases vaccination is the first line of defence for protecting against avian influenza in endemic areas. Commonly available serological diagnostic tests cannot differentiate vaccinated birds from naturally infected birds. Differentiation of vaccinated from infected animals (DIVA), is currently advocated as a means to achieve full control of H5N1. Several DIVA strategies have been attempted and one of the most feasible approaches is based on use of the matrix 2 protein (M2e) of avian influenza virus in a serological test.

The research project will be focused on production of recombinant bacteriophage antigens and its applications for production of mono-specific or monoclonal antibodies. Furthermore these antibodies will be used in competitive ELISA systems for differentiation of infected and vaccinated animal in DIVA-ELISA tests.

### **A novel antimicrobial for treating multidrug resistant infections-two projects available**

**Principal Supervisor: Dr Darren Trott**

Novel antimicrobial agents are required to combat the increasing development of multi-drug resistance in pathogens affecting both human and animal health such as methicillin-resistant *Staphylococcus aureus*. This project offers an unprecedented opportunity to work on a completely new class of antibiotic developed entirely in Australia as part of a multi-disciplinary research team. Two positions are available: the first will develop a mouse infection model to test the efficacy of new generation analogues of the compound against existing classes of drugs and the second will develop new testing methodologies for exploring synergistic action of the new compound with other drugs as well as its ability to inhibit bacterial biofilms.

Scholarships you may be eligible for with this project:

- An honours stipend of \$6,000 per annum is available

### **Prevalence of MRSA in South Australian horses and equine practitioners/owners**

**Principal Supervisor: Dr Darren Trott**

**Co-supervisor: Dr Belinda Noble**

Over 20% of equine veterinarians were culture positive for MRSA on recent Australian survey. Utilizing the School's recently opened Ambulatory clinic and Veterinary Diagnostic Laboratory, this project will conduct a prevalence survey in horses presenting to the practice. Owners, veterinarians and Roseworthy staff will be invited to take part in the research and provide nasal swabs and the veterinary and animal science student body will also be sampled. Positive isolates will be typed and risk factors for carriage by both animals and humans explored.

### **Preliminary investigation into the hindgut microbiota of koalas**

**Principal Supervisor: Dr Darren Trott**

**Co-supervisor: Dr Natasha Speight**

Very little is known about the hindgut microbiota of our iconic native species. The koala has a uniquely evolved hindgut but the resident microbiota are virtually undiscovered. Utilising samples obtained from Kangaroo Island this project will make some initial investigations into tannin complex degrading bacteria, oxalate degrading bacteria and the dominant organisms that make up the intestinal flora. Anaerobic microbiology techniques and molecular techniques will both be utilized.

**Non-antimicrobial control of postweaning diarrhoea in pigs****Principal Supervisor: Dr Darren Trott**

The Pork CRC is devoting a large program to developing alternatives to antibiotics for the treatment of this debilitating disease. Given the success of a project application, an honours project will be available in 2012 (the student must apply directly to the Pork CRC). It is anticipated that the student would spend part of their time at NSW Department of Primary Industries in Menangle.

Scholarships you may be eligible for with this project:

- Pork CRC

**Reduction of winter scours in sheep through continuous exposure to worm antigens to prevent the development of hypersensitivity.****Principal Supervisor: Dr Ryan O'Handley**

It is now well-established that winter scours in sheep are not due to high-moisture pasture plants, nor are they due to high worm burdens. Rather, it is the initial re-exposure to small numbers of worms at the break of the dry season, which causes an overreaction of the immune system leading to hypersensitivity diarrhoea. This hypersensitivity reaction following an extended worm-free period is somewhat analogous to the hygiene hypothesis in humans, in that the lack of exposure to worms results in increased hypersensitivity, allergic, and inflammatory diseases. This hypersensitivity diarrhoea in sheep leads to the development of dags, and dagginess in sheep is highly related to the development of fly strike. The Aim of this project is test the hypothesis that a continuous exposure to worm antigen will prevent the development of hypersensitivity diarrhoea in sheep following infection after an extended worm free period. If continuous exposure to worm antigen can prevent the development of hypersensitivity diarrhoea, this strategy could be applied to preventing the development of hypersensitivity diarrhoea in the field following sudden exposure to worms in the autumn and winter and thus significantly reduce the development of dag and fly strike.

**Techniques to be used**

Sheep previously infected with nematode parasites will be treated with an anthelmintic and placed in individual pens to prevent them from reacquiring infectious 3rd stage larvae (L3s). During the experiment, half the sheep will be continuously exposed to parasite antigens by oral administration of killed and macerated L3s. All sheep will then be challenged with infectious L3s and monitored for the development of hypersensitivity and scours. Changes in haematology (differential cell counts, haematocrit, Hb, immunoglobulins), faecal consistency, wool production, growth rate, and fecal egg counts will be monitored. A subset of sheep in each group will be killed to allow gut sections to be taken for histology.

**Characterisation of the anti-giardial activity of bovine colostrum****Principal Supervisor: Dr Ryan O'Handley****Co-Supervisor: Associate Professor Natalie Keirstead**

*Giardia duodenalis* is a common protozoan parasite in a wide range of mammalian hosts, including humans. In dairy calves, the incidence of infection is close to 100% and *Giardia* may be a cause of disease and production loss. Although a common and widespread parasite in dairy calves, *Giardia* infections do not occur in calves until they are 2- 4 weeks of age. Previous research has demonstrated, bovine colostrum has activity against *Giardia*, and therefore may protect calves against infection for the first few weeks of life. By better understanding the protective mechanisms of bovine colostrum, it may be possible to develop future treatments or vaccinations for this common parasite. The Aim of this project is to determine which components of bovine colostrum exhibit anti-giardial activity in vitro. Bovine colostrum contains high levels of immunoglobulin, specifically IgG, as well as active cells such as neutrophils and macrophages that secrete antimicrobial components. It is not known which of these components are responsible for the anti-giardial activity of colostrum previously observed in experimental studies.

**Techniques to be used**

Bovine colostrum will be collected from our affiliated dairy located in Two Wells. *Giardia* specific antibodies in the colostrum will be examined using western blots, and immunoglobulins will be purified from the colostrum using affinity chromatography. The anti-giardial activity of these purified antibodies

will be assessed using an *in vitro* *Giardia* adherence assay. This work will determine if the protective effect of colostrums is due to immunoglobulins or if other components are responsible for the protective effects observed. In addition to basic immunological and protein purification techniques, the student will also learn to culture *Giardia* and work with this fascinating parasite *in vitro*.

### **Molecular insights into xenobiotic disposition in Australian marsupials**

**Principal Supervisor: Dr Suong Ngo**

While most animals tend to select food low in potentially toxic chemicals, several Australian marsupials rely on eucalyptus leaves as a major or only food source. In order to ingest and absorb such large quantities of toxic plant secondary metabolites in these leaves, specialist eucalyptus feeders such as the koala must have evolved highly specialised detoxification mechanisms involving several liver enzyme systems. The project will examine the dietary effect of eucalyptus terpenes on the induction of CYP4A, peroxisomal Acyl CoA Oxidases and other CYPs in Australian marsupials. The transcriptional regulatory role of the nuclear receptor PPAR-alpha will also be investigated. The project will contribute to the knowledge of the metabolic capacity of Australian marsupials, especially at the molecular level that is limited at present.

### **Appropriate and safe use of Over-The-Counter medications**

**Principal Supervisor: Dr Suong Ngo**

The aim of the project is to investigate whether patients are well informed about over-the-counter (OTC) medications they take, with a focus on non-prescription analgesics, utilizing a cross-sectional study involving multiple item self-administered anonymous questionnaires and stratified samples of patients from community pharmacies. The project aims to identify various pathways that may be used for conveying of safe and accurate information to the patients.

### **Mechanism of herb-drug interaction**

**Primary Supervisor: Dr Suong Ngo**

The effects of St John's Wort (SJW) on membrane transport. The project examines the molecular mechanism by which SJW changes the way the body handles conventional medicines, particularly examining the factors responsible for drug up-take and handling along different regions of the intestines, the liver and kidneys. The project involves extraction and quantification of active constituents of SJW, animal studies, and analyses of CYP3A protein and mRNA expression utilising molecular biology techniques.

### **Generic substitution: assessing *in vitro* bioequivalence of multiple generic medicines**

**Primary Supervisor: Dr Suong Ngo**

The project aims to assess *in vitro* bioequivalence of multiple generic medicines by dissolution test, with a focus on narrow therapeutic index drugs in which a relatively small change in systemic absorption can result in marked changes in therapeutic effects and toxicity.

## **Projects with the Production Animal Health Team**

### **Mobility scoring in dairy cattle**

**Principal Supervisor: Professor Peter Cockcroft**

Locomotion scoring is strongly promoted monitoring tool in cattle practice in the UK. There are well described scoring systems for this process. This project is in two parts.

#### Part 1 Mobility scores in South Australian Dairies

The aim of this project is to video and mobility score 10 South Australian dairy herds (5 feedlot, 5 grass based) and compare the prevalence of lameness with farmers perceptions of the farm prevalence.

#### Part 2 Mobility scoring in dairy cows: Agreement between veterinarians

The videos recorded in part 1 will be used to assess the level of agreement between veterinarians on individual cow mobility scoring.

This project will involve dairy farm visits to record dairy herd locomotion.

### **Short chain volatile fatty acid oral bolus challenge and pH changes as a marker of adaptation to high energy diets in the sheep**

**Principal Supervisor: Prof Phil Hynd**

Co-supervisor: Prof Peter Cockcroft

Transitional ruminants switch from diets with a low energy density to a diet with a high energy density. Examples include beef cattle and lambs entering the feedlot and periparturient dairy cows. Many problems arise from the failure of adaptation resulting in reduced productivity, health and welfare. Poor adaptation has a major economic impact on animal production

The failure of adaptation is characterised by sub-acute acidosis (SARA) and acute ruminal acidosis (ARA). Sub-acute ruminal acidosis (SARA) is characterised by the accumulation of short chain fatty acids SCVFAs in the rumen with a persistent reduction in the rumen pH within the range 5.2-5.7. Acute ruminal acidosis is characterised by accumulations of lactic acid in the rumen and a persistent rumen pH <5.0. These changes are illustrated in Figure 1.

The process of rumen adaptation and the phenotypic variation between individuals with regards to the risk of SARA are poorly understood. This study will investigate the following hypotheses

- Following a challenge with a standard SCVFA load the pH in high energy adapted animals will return to >5.7 more rapidly than low energy adapted animals.
- Following a challenge with a standard SCVFA load the pH in high energy adapted (non-SARA) animals will return to >5.7 more rapidly than animals in high energy adapted (SARA) animals.

### **Synthetic androstenol: a potential alternative to boar exposure**

**Principal Supervisor: Dr Will van Wettere**

It is well accepted that providing gilts and weaned sows contact with a mature boar stimulates ovarian follicle growth, induces and synchronises oestrus, and promotes the expression of oestrus related behaviours (van Wettere and Hughes, 2006). In particular, boar-originating olfactory cues, namely priming pheromones (eg 5-alpha-androstenol), present in saliva are the primary cues responsible for stimulating puberty in gilts and facilitating the return to oestrous cyclicity in weaned sows. There is preliminary evidence indicating that injecting gilts with synthetic 5 - alpha-androstenol (dissolved in ethanol) on a daily basis can promote ovarian follicle growth, and stimulate early puberty attainment. The use of intra-muscular injections of boar pheromones are unlikely to supersede the use of physical boar contact in 'traditional systems'. However, should injectible pheromones prove an effective method of promoting ovarian follicle growth and synchronising oestrus this technology represents an easy to implement strategy of facilitating lactational oestrus (thus negating the need to run boars into and out of the farrowing shed), equally it could potentially be used to increase the efficacy of exogenous gonadotrophin based ovulation stimulation protocols. With regard to the latter, recent studies conducted in our laboratory (Bartlett et al., 2009) demonstrate that the provision of boar contact

improves the potential litter size of gilts stimulated to ovulate using PG600. The current study will investigate whether injecting weaned and lactating sows with 5-alpha-androstenol will promote ovarian follicle growth, resulting either in a pre-weaning oestrus or a reduction in the weaning-to-oestrus interval.

Scholarships you may be eligible to apply for with this project:

- Pork CRC
- Ronald J Lienert Memorial Scholarship

**Improving welfare of group housed sows: reducing frustration and aggression**  
**Principal Supervisor: Dr Will van Wettere**

There is growing pressure from consumers and large food retail chains to improve the care and welfare of breeding sows by eradicating the use of individual gestation housing. The general public and experts consider animal welfare to be improved under group housing situations, primarily due to the opportunity for exercise and social and environmental interaction provided. However, the aggressive encounters which inevitably occur under group housing conditions exert a negative impact on animal welfare, as well as causing reproductive failures and structural damage. It seems inevitable that legislation will favour a phase out of individual stalls to be replaced by group housing systems. Therefore, to maintain industry productivity and profitability, whilst optimising sow welfare, it is imperative that strategies are developed to reduce aggression. Competition for resources, such as food, has been identified as a trigger of inter-animal aggression. It is current industry practice to feed sows a relatively high density, rapidly digestible diet during the first 14 – 28 days post-insemination, with the aim of maximising embryo implantation and thus farrowing rates and litter sizes. However, we postulate that this strategy promotes rapid consumption of food and promotes aggressive encounters at feeding times. In addition, the rapidly digestible nature of the feed likely fails to induce feelings of satiety, resulting in increased physical activity and ‘frustration’ and altering time budgets in favour of aggression. The proposed study will, therefore, test the hypothesis that providing group housed sows and gilts with a high fibre, slowly digestible diet will reduce incidences of aggression, as evidenced by behavioural measures and injury scores, whilst maintaining reproductive output.

Scholarships you may be eligible to apply for with this project:

- Pork CRC
- Ronald J Lienert Memorial Scholarship

**Pre- and post-mating nutritional manipulation: effects on follicle function, oocyte development, potential litter size and sow behaviour/welfare**

**Principal Supervisor: Dr Will van Wettere**

Co-Supervisor: Assoc. Prof Roy Kirkwood

In pigs, litter size is largely determined by the number of embryos surviving the first 20 – 30 days of gestation (embryo survival). Embryo survival is affected by the quality of the oocyte (egg) shed at ovulation, as well as the capacity of the post-mating uterine environment to support embryonic development. The quantity and composition of the diet consumed by female pigs prior to mating is known to be a primary determinant of the number and quality of the oocytes shed at ovulation, and thus embryonic survival. However, it remains controversial whether high or low post-mating feeding levels promote embryo development and survival. With 30% of fertilised oocytes failing to survive implantation and develop into live piglets and feed grains representing a significant cost of production, there is increasing need to develop feeding regimes which reduce oocyte and embryo loss, whilst maintaining, or even decreasing, feed costs. As a consequence, there are **three projects available**: **Project one** will investigate the effect of different fibre sources on ovarian follicle function and oocyte development.

**Project two** will investigate the effect of feeding high fibre diets post-mating on embryo survival, pregnancy rates and sow behaviour and welfare.

**Project three** will investigate the effect of feeding levels prior to and after mating on ovarian function, embryo development and survival and pregnancy outcomes.

Techniques:

- Animal handling skills (including collection of blood samples)
- Laboratory skills: aspiration of ovarian follicles, in vitro maturation and fertilisation of oocytes

Scholarships you may be eligible to apply for with this project:

- Pork CRC
- Ronald J Lienert Memorial Scholarship

### **Improved piglet performance through increased polyamine ingestion**

**Principal Supervisor: Dr Will van Wettere**

Co-supervisor: Dr Bec Forder

Piglet growth during the immediate post-weaning period is often compromised as a result of their failure to adapt to the switch from a milk-dominated to a cereal-dominated diet. Commonly referred to as post-weaning growth check, this period of adaptation and resultant decline in growth exerts a significant impact on overall herd feed conversion efficiency, increasing the time taken to attain market weights, and in severe cases resulting in mortality. Structural and functional changes in the small intestine that cause a decrease in digestive and absorptive capacity in the weaned pig and are key contributors to the growth check in weaned piglets. Milk-borne polyamines (putrescine, spermidine and spermine) trigger a series of changes in the gastrointestinal tract of the suckling offspring that help it adapt to the progressive transition from a milk dietary regime to a solid dietary regime. However, early weaning programs designed to increase sow productivity have driven the average weaning age below 21 days, meaning piglets are likely to have insufficiently matured gastrointestinal tracts. The proposed project builds on our recent data demonstrating a positive effect of polyamine supplementation during lactation on piglet growth and intestinal function. Specifically, the objective of the proposed work is to manipulate maturation of the piglet gut during the peri-weaning period with the aim of improving pre-weaning survivability and dietary adaptation, leading to a subsequent increase in post-weaning performance. The hypothesis being that administration of polyamines to piglets will accelerate maturation of the gastrointestinal tract and increase availability of essential amino acids allowing for more effective diet transition post-weaning leading to greater post-weaning performance and subsequent grower/finisher performance.

### **Alternative methods for controlling gill and skin fluke in yellowtail kingfish**

**Principal Supervisor: Dr James Munro**

Controlling flukes of yellowtail kingfish (YTK) is a major cost for producers, and the industry has identified improving the treatment of flukes as one of the top research priorities. Currently, the industry bathes fluke-infested YTK in hydrogen peroxide or uses approved medication. Although this approach is currently efficacious, it is also costly, stressful for fish and possibly environmentally detrimental. An option to reduce the impacts of treating for flukes affecting YTK is to use an alternative treatment method, involving hyper-saline baths.

This project aims to determine the efficiency of hyper saline bathing for the control of fluke affecting YTK in sea cages and to determine any detrimental effects the treatment has on YTK.

### **Development of bacteriophage therapy in marine hatcheries**

**Principal Supervisor: Dr James Munro**

The growth of the marine aquaculture industry is significantly affected by infectious disease with the main causative agents being bacteria and viruses. Bacterial infections pose a major problem in both hatcheries and growout often resulting in mass mortalities (70-90%) typically associated with pathogenic *Vibrio* spp. *Vibrio tubiashii* has recently been identified as a pathogen causing large scale mortalities in US West Coast oyster hatcheries and has been isolated from Australian shellfish hatcheries during periods of high larval mortality. These recent problems have resulted in significant shortfall of spat supply in Australia and the US and threatened the viability of oyster farms in the US.

Antibiotics are still often used as a method of control for bacterial infections in hatcheries. However, antibiotic resistant strains are fast becoming a reality and a ban on residues of antibiotics in aquaculture species by a number of importing countries has highlighted the need for an alternative method.

Bacteriophage, commonly termed phage, is a group of viruses that infect bacteria. Phage are ubiquitous and are found wherever bacteria exist including soil, water and intestinal tracks of animals. Although discovered almost 100 years ago, only recently have their potential as antibiotic alternatives has been acknowledged. The therapeutic potential for the use of phage in the control of vibriosis in aquaculture has been reported for fin fish and prawns with promising results.

This project will focus on the isolation and trial of bacteriophage that have the potential to control outbreaks of pathogenic *Vibrio* spp. in Australian marine hatcheries.

The aims of the project are below:

1. Isolate *Vibrio* sp. from marine hatcheries including sediment, water and moribund animals.

Strategy: *Vibrio* will be sourced from marine hatcheries within their production season as well as from existing bacterial culture libraries.

2. Isolate lytic bacteriophage from marine farm and hatchery waters to increase biocontrol potential.

Strategy: Phage will be isolated from local hatcheries, Isolation of each bacteriophage will be undertaken using previously published methods. Bacteriophage investigations will include purification, electron microscopy and determination of efficacious titres.

3. Determine the host ranges of bacteriophage isolates.

Strategy: To develop of a suite of bacteriophage isolates that is specific to the *Vibrio* sp. of significance. The development of this 'bacteriophage cocktail' will reduce the possibility of bacteriophage resistance. In order to meet this objective the bacterial isolates determined from the farm samples will be used to determine the host range of the bacteriophage.

### **Antibiotic resistance in bacteria associated with aquarium fish**

**Principal Supervisor: Dr James Munro**

The aquarium industry is a rare industry in that it imports live animals from around the world which are collectively held in quarantine facilities for short durations. There is a common practice to treat the fish with broad antibiotics during transport as a means of prophylactic treatment against bacterial infections. This wide spread practice has the potential to promote antibiotic resistance within the industry. This poses a risk to veterinary and human medicine due to the risk of antibiotic resistant genes being transferred to bacteria that are capable of infecting animals or humans in close contact with the aquarium fish.

The aims of this project are to screen aquarium fish for bacteria and to screen these bacteria for antibiotic resistance genes which may confer resistance to antibiotics commonly used in veterinary and human medicine.

## **Projects with the Reproduction and Genetics Team**

### **Marbling in beef: Turning muscle into fat?**

**Principal Supervisor: Dr Cindy Bottema**

Marbling or intramuscular fat in beef is highly prized in some export markets, such as Japan and Korea. Since a premium is paid for intensely marbled meat in these markets, producers seek to control intramuscular fat deposition in cattle through nutrition. Long term grain feeding on diets low in beta-carotene will increase marbling in some cattle breeds. However, in other cattle breeds long term grain feeding merely increases the amount of subcutaneous fat. Thus, it is clear that there are breed differences in terms of intramuscular fat deposition and one possible mechanism is differing abilities to convert muscle cells into fat cells. Therefore, the aim of this project is to study the ability of different cattle breeds to convert muscle cells to fat cells.

There is a genetic component to marbling or intramuscular fat deposition in cattle, but the underlying genes have not been discovered. One of the issues is that the process of marbling is not well understood. There is much debate about whether the process involves increasing the amount of lipid filling in mature adipocyte fat cells (hypertrophy) OR whether the process involves increasing the actual number of mature adipocyte fat cells (hyperplasia). Increasing the amount of lipid filling implies that some cattle breeds specifically accumulate more fat in intramuscular adipocytes than in other types of adipocytes. Increasing the number of mature adipocytes implies that some cattle breeds have more fat precursor cells (pre-adipocytes) in their muscles. There is evidence supporting both of these hypotheses and the debate is ongoing with no further progress towards determining the specific genes controlling marbling.

Recently though, it has been observed in humans, rodents and even pigs that it is possible to convert mature muscle cells into adipocytes. Previously, it had been assumed that only preadipocytes could develop into mature adipocytes. This observation opens an entirely new area of investigation as it is quite possible that some cattle breeds under certain circumstances (eg, long term grain feeding) may convert their muscle cells to fat cells and thus, increase the amount of intramuscular fat. To investigate this possibility, muscle biopsy samples from cattle breeds that differ in their ability to marble (eg, Angus, Hereford) will be tested using cell culture. The number and size of the fat cells converted from muscle cells will be monitored using differential staining and microscopy. PCR of specific gene markers for the various cell types will be used to verify the results.

#### References:

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GS Harper, DW Pethick (2004). How might marbling begin? *Aust. J. Exp. Ag.* 44:653-662.

### **Animals with willpower: Genes controlling feed intake in cattle**

**Principal Supervisor: Dr Cindy Bottema**

The purpose of this project will be to investigate the observed metabolic differences between high and low net feed intake cattle by using real-time PCR to examine the expression of key genes. Differences in gene expression will be correlated with DNA sequence variants in an effort to develop a DNA test for selection of feed efficiency in cattle

Genome mapping in livestock is utilised to determine which genes control which production traits. First, the trait is mapped to regions of the genome known as quantitative trait loci (QTLs). Secondly, the gene within the chromosome region controlling that trait is identified. By identifying the gene, DNA tests can be developed and applied in breeding programs to select for the trait. Feed is the single largest cost for cattle producers. Therefore, the highest priority for a DNA test is one that can be used by the beef and dairy industries to select for efficient cattle with low feed intakes. The Davies Cattle Gene Mapping Project was established to map the genetic loci controlling cattle production traits. The mapping herd was designed using backcrosses between the Jersey dairy breed and the Limousin beef breed in order to study such traits as fatty acid composition, marbling, meat yield, growth rate, age of puberty, etc and net feed intake. Thus, during the course of this cattle genome mapping project, 4 specific chromosomal regions (QTL) were identified that are likely to control net feed intake.

In an effort to discover the actual genes underlying these QTL, a series of experiments have been initiated to examine the physiological differences between animals with high feed intake and animals with low feed intake. Proteomic and biochemical differences have been discerned, however, these observations need to be confirmed using molecular approaches so the genes themselves can be identified.

References:

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Arthur PF and Herd RM (2005). Efficiency of feed utilisation by livestock: Implications and benefits of genetic improvement. *Can. J. An. Sci.* 85:281-209.

**Comparison investigation of expression of DICKKOPF (DKK-1) by osteoblasts like cells from normal and osteoporotic sheep using a human DKK-1 antibody (in vitro study).**

**Principal Supervisor: Dr Cindy Bottema**

The Wnt signalling pathway plays a major role in promoting and regulating osteoblastogenesis. It is well documented that activation of this pathway increases bone formation in numerous species including humans. Wnt signalling is negatively modulated by numerous inhibitors such as Dkk-1 which plays a major role in inhibiting this pathway. Blockage of Dkk1 activity has been proposed as a potential treatment for osteoporosis. Our group has developed an osteoporotic sheep model for characterising the skeletal pathology and assessing various treatment modalities for this disorder. We propose to investigate the present of Dkk1 on ovine bone under in vitro conditions.

Osteoblast-like cells from osteoporotic and control sheep will be cultured to have adequate number of cells for conducting this experiments using an established method [1]. Primary human MSCs which have been transduced to overexpress Dkk-1 will be used as positive controls.  $1-2 \times 10^5$  cells per each animal will be fixed in 1% paraformaldehyde for 20 minutes at room temperature. Then the cells (from both sheep and human) will be incubated with an appropriately diluted primary antibody or isotype-matched control (diluted in blocking buffer- as negative control) on ice for 1 hour. Then all cells will be washed twice in ice-cold intracellular wash buffer, to remove unbound antibody, and will be resuspended in 50 $\mu$ l of appropriately diluted secondary antibody (diluted in blocking buffer). Following incubation with secondary antibody, cells will be washed twice in ice-cold intracellular buffer and be resuspended in FACS Fix to be analysed by flow cytometry, and the data stored as list mode data for further analysis.

This study will also demonstrate if the Dkk-1 in sheep has strong homology with Dkk-1 in human. It will also provide valuable information in regards to role of Wnt pathway in sheep and it will assist our understanding of the mechanisms of bone loss in the current animal model. Such information can be utilised for pre-clinical validation of anti-Dkk1 antibody as a potential treatment for osteoporosis.

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**Osteocytes and canalicular density in vertebral trabecular bone of osteoporotic subjects**

**Principal Supervisor: Dr Cindy Bottema**

Osteocytes are actively involved in the turnover of bone matrix through various mechanosensory mechanisms. Given the considerable evidence supporting osteocytes as local initiators of bone remodeling, we believe that lacunar and canalicular density may be altered in osteoporotic subjects.

A minimum of 10 fresh cortico-cancellous bone samples from the base of the lumbar spinous processes will be collected from osteopenic female patients (matched as close as possible for age) undergoing decompressive laminectomy surgery for spinal stenosis. As controls, similar bone samples will be collected from female cadavers that do not have osteoporosis. Bone biopsies will be screened for Bone Mineral Content and Bone Mineral Density by Dual Energy X-ray Absorptiometry. All bone samples will be processed to yield 3D bone histomorphometry data from Micro-CT images. The samples will then be decalcified and embedded in paraffin from which 4  $\mu$ m sections will be stained to demonstrate osteocytes and the associated canalicular network. The areal density of

osteocytes and canaliculi per unit area of bone will be measured using light microscopy and the Quantimet 500 Image Analyser and correlated with previously acquired histomorphometric data.

Osteoporosis is the most common musculoskeletal disorder, characterized by low bone mineral density and structural deterioration of bone, leading to fractures. Excessive bone resorption (due to increased osteoclast activity) relative to bone formation is the principal cause of bone loss in postmenopausal osteoporosis but recent studies suggest that inappropriate apoptosis of osteoblasts and osteocytes account, at least in part, for the imbalance in bone remodeling. This study will assist in further characterisation of osteocyte function and the role of these cells in bone turnover in osteoporosis.

### **Maternal productivity of beef cattle**

**Principal Supervisor: Associate Professor Wayne Pitchford**

We are currently running a very large National project on beef cattle with lots of data collected. There is a large amount of data available with many questions that could be answered.

There is also a sister project in Northern Australia with Brahman and Composite cattle and work is needed to test if conclusions found in southern Australia (Angus and Hereford) also hold in northern Australia, and vice versa.

There is a great opportunity to be linked into a National network of scientists and funding bodies.

### **Maternal productivity of sheep**

**Principal Supervisor: Associate Professor Wayne Pitchford**

There is currently a very large National sheep project with lots of data being collected. There is a large amount of data available with many questions that could be answered. The project could have a focus on lamb survival, meat or wool production.

There are also sheep breeding data sets available from previous projects.

There is a great opportunity to be linked into a National network of scientists and funding bodies.

### **Maternal productivity of sows**

**Principal Supervisor: Associate Professor Wayne Pitchford**

There are currently a range of National projects on pigs with lots of data collected. There is a large amount of data available with many questions that could be answered about genetic aspects of pig production and breeding.

There is a great opportunity to be linked into a National network of scientists and funding bodies.

Other information:

There is definitely potential for Pork CRC scholarships.

### **Pastoral beef cattle production**

**Principal Supervisor: Associate Professor Wayne Pitchford**

The Northern Territory Dept are always looking for people to be involved in beef cattle research projects and are keen for students from Roseworthy. Specific project vary over time so if interested, then we can get more information.

There is a great opportunity to be linked into a National network of scientists and funding bodies.

### **Beef quality in South Australia**

**Principal Supervisor: Associate Professor Wayne Pitchford**

We have access to some industry data sets that provide the opportunity to answer questions about factors affecting carcass and meat quality throughout different times of the year. Past students in this area have taken either a production or animal behaviour slant approach. There are opportunities for further work in the area.

There is a great opportunity to be linked into a National network of scientists and funding bodies.

**Attitudes of stud beef cattle breeders to BREEDPLAN****Principal Supervisor: Associate Professor Wayne Pitchford**

We are currently running a very large National project on beef cattle with lots of data collected. There is a large amount of data available with many questions that could be answered.

Part of the project was a series of interviews conducted with leading breeders. Some messages have been extracted from this resource, but there is opportunity to interrogate the information and write up attitudes to a range of issues. This is a social science project and so this provides an opportunity to broaden skills from science degree.

There is a great opportunity to be linked into a National network of scientists and funding bodies.

**Imprinted quantitative trait loci in cattle****Principal Supervisor: Professor Stefan Hiendleder**

Several honours projects involving different imprinted genes are available.

The project is part of a major research initiative into epigenetic gene regulation and genotype x environment interaction in domestic animals. An honours project to assess the effects of allelic variants of selected imprinted genes on a range of phenotypic parameters in cattle is available. This study analyses production traits such as birth/weaning weight, carcass characteristics and fertility parameters. Specifically the project includes:

1. Isolation of DNA from blood samples of cattle with *Bos taurus* and *Bos indicus* genetics
2. Sequencing of imprinted candidate genes and typing of single nucleotide polymorphisms (SNPs)
3. Quantitative trait loci (QTL) analyses and identification of favourable alleles as tools for marker assisted selection

Epigenetic modifications of the genome (e.g. DNA methylation) are transiently heritable and have significant effects on gene expression and phenotype in mammals (Hiendleder et al. 2004). Several epigenetic mechanisms that infringe Mendelian rules of inheritance, including genomic imprinting, are currently under study. Imprinting causes a parent-of-origin dependent allele-specific gene expression, is species-specific, and affects a large number of phenotypic traits (e.g. <http://igc.otago.ac.nz/home.html>). In silico and experimental data predict several thousand imprinted genes in mammals, but less than 100 imprinted loci have been characterized. Imprinted QTL regions with major effect have been reported in pig (e.g. Nezer et al. 2000) but data are lacking in bovine. Understanding imprinted gene effects is important because standard quantitative genetic models for deriving breeding values, population variances and covariances between relatives, are not equivalent when imprinting is acting. In addition, because of their transient nature that requires reprogramming during gametogenesis and embryonic development, epigenetic modifications are subject to change induced by environmental factors such as nutrition during prenatal development (foetal programming). Genes under epigenetic control are therefore strong candidates for genotype x environment interaction effects that can compromise quantitative trait loci identification and utilization strategies.

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**Projects with the Companion Animal Health Team****Molecular characterization of canine mast cell tumors****Principal Supervisor: Dr Anne Peaston**

Mast cell tumours are the most common malignant skin tumour in dogs. They can be divided on the basis of histopathologic analysis into different prognostic groups for cure by surgical removal alone, namely those with a good prognosis, and those with intermediate or poor prognosis. Animals with a poor prognosis for surgical cure can benefit from chemotherapy in addition to the surgery, but the duration of response is only a few months for many dogs. A new drug will soon be licensed in Australia specifically for the treatment of canine malignant mast cell disease. Durable responses to treatment with this drug have been reported from North America. The drug is directed against the activity of an abnormal protein encoded by a mutation in the c-Kit gene. The mutation occurs in about 20% of mast cell tumours, with highest prevalence in the intermediate or poor prognosis groups. A test for the mutant gene would potentially assist in management decisions for dogs with intermediate and poor prognosis mast cell tumours.

Aims of the project:

1. To develop a tumour bank of canine mast cell tumours to act as controls for subsequent work.
2. To establish in our hands a PCR test for the commonest type of c-Kit mutation reported in these tumours.
3. To survey mast cell tumours in Australian dogs to determine the incidence of c-Kit mutation.

## **Projects with the Veterinary Public and Population Health team**

### **Infectious causes of reproductive failure in beef cattle in SA**

**Principal Supervisor: Professor Michael Reichel**

In 2008, PIRSA conducted a serological survey of beef and dairy cattle properties in South Australia. A random sample of 16 blood samples was collected from each of 32 dairy and 83 beef properties and analysed for the presence of antibodies against Bovine Viral Diarrhoea (BVD). A questionnaire was administered to the participating properties and results are available from 111 farms.

While sera from dairy properties were assayed for three pathogens (BVD, Neospora and Leptospirosis) that may be causes of reproductive failure, the beef sera were never assayed for the presence of antibodies against *Neospora caninum* or leptospirosis. A number of sera from about 60 odd beef properties from that 2008 sampling are still available and could be assayed, by ELISA, for the two remaining pathogens (and possibly Liver fluke antibodies), and the results analysed in conjunction with and against the questionnaire results.

Hence the Aims of this project are to establish the relative and absolute contribution of leptospirosis and neosporosis to reproductive failure in beef cattle in SA. To this end the study will establish (Objectives) the seroprevalence of both, leptospirosis and neosporosis on beef cattle properties in SA, and analyse the questionnaire results in conjunction with the serology data with a view of identifying any relevant risk factors.

This project involves some laboratory work, data manipulation and analysis and might suit a student with an interest in laboratory diagnostic work as well as epidemiological analysis. Some experience with the manipulation of Excel spreadsheets would be a distinct advantage.

### ***Neospora caninum* infection in greyhounds**

**Principal Supervisor: Professor Michael Reichel**

The issue of *N caninum* infection in greyhounds continues to be discussed and the infection is often blamed for abortions, stillbirths and clinical episodes in young pups. These are the clinical signs often reported and associated with *N caninum* infection in dogs (1). Greyhounds are also often bred and reared in areas of high cattle population, especially on or amongst dairy farms where the copious supply of 'unfit for human consumption' milk and skinny cows have been readily consumed by large numbers of greyhounds. A first step to determining the higher or not exposure of greyhounds to *N caninum* infection would be a serological survey, using a competitive ELISA (VMRD, Pullman, WA, USA) that has been validated for use in dogs, on different population of greyhounds (those that have been raised on dairy farms, fed raw bovine tissue etc. compared with city-raised, fed on commercially prepared diets etc.). Dr J McNicholl is preparing to sample greyhounds around racetracks around South and South-Eastern Australia and a survey could be constructed around her sampling route. Appropriate application of a questionnaire might be used to identify risk factors in the feeding and/or rearing of these greyhounds.

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### **Sheep Health Questionnaire**

**Principal Supervisor: Professor Michael Reichel**

A questionnaire was sent out to 5000 sheep farmers in SA and about 2000 completed replies were received. There is a need to have the survey replies (currently collated in an Access database) analysed. The questions in the survey related to topics around farm management and animal health practices, and herd health outcomes, as well as farmer attitudes to disease outbreak reporting. The analysed information will be used to determine extension messages for SA sheep producers to improve sheep health management and production, as well as to influence Biosecurity SA livestock disease surveillance policy development. Some specific associations to be measured have been identified but there would be latitude to explore the data further.

**Behavioural effects of placental restriction, neonatal growth and dietary methyl supplementation****Principal Supervisor: Dr Susan Hazel,**

Poor growth before birth (IUGR) is associated with decreased cognitive function in human children, as well as increased risk of metabolic disease in later life. These growth-restricted babies also characteristically have accelerated neonatal growth rates (neonatal catch-up growth). Rapid neonatal catch-up growth is independently associated with metabolic disease and obesity in later life, but positively predicts improved neurological development and survival. Using an ovine model of poor growth before birth, which produces similar adverse metabolic consequences as human IUGR, we wish to test whether neonatal interventions that improve insulin secretion, but which slow neonatal growth, have any impact on behaviour in early postnatal life. The Honours student will gain skills in animal handling including measures of behaviour and use of behavioural analysis software, data analysis, written and oral presentation skills.

**Puppy Preschools in the Adelaide Area****Principal Supervisor: Dr Susan Hazel,**

A puppy socialisation and training program, or Puppy Preschool, aims to both socialise puppies during an important developmental stage of their life, and also enhance their basic training. The end result should be a dog that makes a better pet, thus enhancing the bond between the dog and human owner/s. This in turn may reduce the thousands of dogs relinquished at animal shelters each year.

There has been only one peer-reviewed study of the effects of a puppy socialisation and training program on puppy behaviour. Seksel et al. (1999) showed that puppy socialisation programs could enhance the response of the puppies to commands, but no significant effects were seen on the responses to various social stimuli. Despite the lack of evidence for their efficacy, Puppy Preschools are prevalent in Australia. This study will collect basic demographic data on Puppy Preschools in the Adelaide area, along with data on dog behaviour from owner questionnaires and a measure of the attachment between the primary caregiver and the dog. The hypotheses to be tested are:

- Puppy Preschools in Adelaide will vary widely in their demographic factors, including experience and qualifications of people running the program, class size, and material given during the class.
- Factors relating to the Puppy Preschools (such as class size) will be associated with the incidence of behavioural problems in the puppies/dogs.
- Factors relating to the Puppy Preschools (such as class size) will be associated with the attachment between the primary caregiver and the puppy/dog.

It is hoped that the results of the study will enable evidence-based guidelines to be written for best practice in running a Puppy Preschool.

**Research Plan**

1. Determine the location of the Puppy Pre-Schools in the Adelaide metropolitan area
2. For each puppy pre-school a survey will be used to determine factors such as qualifications of staff, number of dogs in each class, and socialisation methods.
3. Conduct Pre- and Post Puppy Pre-school survey of puppy owners, with questions including demographic data on the dog, and any behavioural problems of the puppy.
4. Conduct a survey of dogs (1-3 years of age) at veterinary surgeries around Adelaide, with questions including whether or not the dog attended a Puppy Preschool, training and any behavioural problems. An Attachment Questionnaire will also be used to assess the attachment between the dog and owner (Winefield et al. 2008).

Scholarship: \$5000 from the Dog and Cat Management Board

**References**

- Seksel K, Mazurski EJ, Taylor A (1999) Puppy socialisation programs: short and long term behavioural effects. *Applied Animal Behaviour Science* 62:335-349
- Winefield HR, Black A, Chur-Hansen A (2008) Health effects of ownership of and attachment to companion animals in an older population. *International Journal of Behavioural Medicine* 15:303-310

**'Puppy and Up': A study of temperament in puppies and human attachment and how this affects the human-dog bond.****Principal Supervisor: Dr Susan Hazel,**

Thousands of dogs are relinquished to shelters or pounds every year, with the majority requiring euthanasia as insufficient replacement homes are available. This study will investigate factors relating to both the dog and the human to establish whether or not we can predict the health of the human-dog bond. These factors include:

1. Puppy temperament: the temperament is the more stable component of an individual animal's behaviour. Dogs may display more or less fearfulness, aggression, fearfulness, social dominance and responsiveness to training (Jones & Gosling 2005). If temperament is measured in puppies it may predict the success of these dogs as companions in later life, for example if a puppy shows higher trainability it may go on to make a better pet.

2. Human attachment: no matter what the temperament of a new puppy, the success of their integration into a new home relies on human attachment. If attachment does not occur the dog is at high risk of relinquishment or re-homing.

The aim of this study is to test whether puppy temperament and human attachment can be used to predict whether or not the human-dog bond turns out to be a positive or a negative one.

**Research Plan:**

The study will be a longitudinal study beginning when puppies are 6-12 weeks of age when they are still with their breeder, and following the same puppies for approximately six months after they move to their new owners. Temperament tests will be performed in the puppies before re-homing, and then at follow-up at approximately three and six months. Questionnaires will be used to investigate the expectations of the new owner before the new puppy is brought home, and then the attachment to the new puppy over the following six month period. This is a preliminary study and the plan is to expand it in the future to follow the human dog bond over a longer time period.

**Reference:**

Jones AC & Gosling SD (2005) Temperament and personality in dogs (*Canis familiaris*): A review and evaluation of past research. *Applied Animal Behaviour Science* 95:1-53

**Thermoregulation in hares****Principal Supervisor: Philip Stott**

**Aims of project:** To assess the mechanisms by which the European hare copes with extreme heat.

The jackrabbits of North America (which are hares) were the focus of Knut Schmidt-Nielsen's seminal work on the adaption of animals to desert environments. However, Schmidt-Nielsen did not have reliable data on core temperatures, because modern electronic sensors were not available in his era. Further, one of Schmidt-Nielsen's conclusions about the role of the ear in thermoregulation has been shown to be somewhat in error (Stott *et al.* 2010). The Roseworthy Campus has a captive population of European hares, and experiences extreme temperatures in most summers. The hypothesis to be examined is that thigmothermy (heat exchange with the ground) is a significant mode of thermoregulation in hares on extremely hot days. In this study, you would use implanted temperature sensors that can be monitored remotely, together with an infra-red surface temperature probe to investigate the thermal relations of hares. You would compare data from mild days with data from extreme days, and the outcome of your project would depend on your willingness to attend Roseworthy on extreme days, even if it included Christmas Day. Included in the project would be the provision of different levels of shade and monitoring the position of the subject hares relative to the availability of shade. You would also disturb hares on extremely hot days and measure soil temperatures at different depths. All work would be undertaken on campus.

**References:**

Stott, P., Jennings, N., and Harris, S. (2010). Is the large size of the pinna of the ear of the European hare (*Lepus europaeus*) due to its role in thermoregulation, or in anterior capital shock absorption? *Journal of Morphology* 271, 674-681.

**Grazer Impacts on Vegetation Restoration****Principal Supervisor: Dr Phil Stott**

Aim: To test the hypothesis that browsing impact by introduced herbivores (rabbits, hares, perhaps goats) on tree plantings is greater than by native herbivores (kangaroos).

**Methods**

- differential tree guards
- counting densities of rabbits, hares, and kangaroos using two techniques:
  - distance sampling, involving a vehicle, a laser rangefinder (distance measurer) and compass
  - dung counts

**Other information**

Field Location – Calperum Station, about 18 km north of Renmark.

Assistance – courtesy of the Australian Landscapes Trust. Free on-site accommodation, on-site use of 4WD, existing plantings or plantings put in by the ALT for the project, materials eg, tree guards, labour to assist the establishment of the project e.g. helping to erect tree guards; labour to assist monitoring (eg, spotlighting, checking on things while you're away), on-site co-supervisor (Dr Peter Cale).

**Novel strategies to enhance creep attractiveness and reduce piglet mortality****Principal Supervisor: Dr Alex Whittaker****Co-Supervisor: Dr Will van Wettere**

The aim of this project is to investigate several simple and inexpensive strategies for encouraging greater use of creep areas by piglets in multi-suckling pen systems. Successful strategies would thus reduce the incidence of piglet crushing as a primary outcome. The study will initially use simple preference-based testing and then use an applied approach to evaluate promising strategies in a "real-life" scenario.

**Investigation into preputial gland ablation as a method to modify murine pheromones to control aggression in group housed male mice****Principal Supervisor: Dr Alex Whittaker****Co-supervisor: Dr Lewis Vaughan (Gilles Plains TAFE)**

A common problem in group housing of male mice in the laboratory animal industry is that of fighting which can be so serious as to necessitate single housing of animals. Previous work by Dr Vaughan has shown (as might be expected) that castration of mice reduces this problem significantly and can therefore be used as a management tool. However, in a research animal setting the effect that this has on endocrinological parameters, and therefore interpretation of research data, is significant. The castration effect is likely to work by elimination of male pheromones which indicate social status in the group. The aim of this project is to determine whether another method of reducing pheromone cues, preputial gland ablation, will reduce agonistic encounters. Lack of hormone production by this gland, ensures that research parameters are not unduly affected. A successful outcome will provide a simple solution to colony management of laboratory mice.

## **Projects with the Equine team**

### **Feeling Good, Feeling Bad: Human Expressions on Dog Faces**

**Principal Supervisor: Dr Erik Noschka**

It is commonly held that most facial expressions of emotion emerged with the origin of primates and hominids. We will probe this assertion by looking in the face of man's best friend – the dog. In this study we will test if dogs may produce discernible facial responses when placed in situations of reward, isolation, and threat and human observers reliably identified dog emotion or valence. Moreover, identification accuracy may correlate with that for human facial expressions suggesting similarities in the way dogs and humans communicate emotions – similarities that benefit cross-species interactions and domestication.

### **Electrolyte supplementation and clinical & telemetry-ECG examination in endurance horses during competition**

**Principal Supervisor: Dr Lidwien Verdegaal**

Co-Supervisor: Dr Sam Franklin

Confusion exists about the optimal amount and types of electrolyte supplementation to endurance horses as well as how and when they should be administered. Additionally no evidence exists what feeding practices are used in the field. The objective is to perform a survey (by using a questionnaire) of feeding and electrolyte supplementation practices by endurance riders. Riders competing in endurance rides in SA will be recruited. The data will be collected at 1-2 endurance rides during the weekend (findings will be related to blood & urine analysis sampled at the same endurance ride). The students will be involved in formulation and delivery of the questionnaire and subsequent data analysis.

Limited information exists about the prevalence and the cause of cardiac arrhythmia during endurance rides. The objective is to determine the prevalence of arrhythmias in endurance competition horses & investigate possible risk factors. Telemetric ECG recordings will related to different parameters including clinical hydration status, blood analysis and urine analysis in endurance horses during competition.

### **Continuous telemetric monitoring of body temperature in exercising endurance horses**

**Principal Supervisor: Dr Lidwien Verdegaal**

Understanding thermoregulation during exercise is important to protect competing horses from complications like heat stress to improve welfare during endurance and 3-day competitions. Currently no information exists about the continuous temperature and its relation to dehydration & development of hyperthermia in long-distance exercising horses. Gastro-intestinal temperature measurement using an ingestible pill may provide a non-invasive and an easy-to-use tool to measure body temperature used in experimental (laboratory & field) studies and as a preventive tool during competitions. A telemetry-based GI (mobile) pill is used in human athletes<sup>1</sup>, exercising dogs<sup>2</sup> and validate in resting normal horses<sup>3</sup>. The objective is to collect data measuring the continuous temperature in non-conditioned school horses and in horses during competition. The collected data will be related to different parameters like the speed during competition, environment parameters, the heart rate (or ECG recordings), level of dehydration & electrolyte loss (by clinical exam & biochemical parameters) and to elimination of the horses during competition.

#### References:

1. Casa D.J. et al. Influence of hydration on physiological junction and performance during trail running in the heat. *J. Athletic Training* (2010); 147-156.
2. Angle A.C. and Gillette R.L. Telemetric measurement of body core temperature in exercising unconditioned Labrador retrievers. *Can. J. Vet. Res.* (2011); 157-159.
3. Green A.R., et al. Measurement of horse core body temperature. *J. Thermal Biology* (2005); 370-377.

### Previous Honours Projects within the School of Animal & Veterinary Sciences

For a complete list, please visit:

[http://www.adelaide.edu.au/vetsci/honours/past\\_projects.html](http://www.adelaide.edu.au/vetsci/honours/past_projects.html)

Topic of project	Principal Supervisor
The use of zein as a feed additive to create a weak point in wool – an alternative to mulesing in sheep	Phil Hynd
Effects of three peri- and post weaning dietary regimes on piglet growth performance and intestinal sucrase activity.	Gordon Howarth
Response to selection method on visual traits in South Australian merino sheep	Wayne Pitchford
Molecular genetics of bovine fatty acid composition	Cindy Bottema
Relationship between cattle behavior and beef quality	Wayne Pitchford
Bovine Viral Diarrhoea (BVD) in cattle herds in South Australia	Michael Reichel
Artificial dens to attract foxes	Phil Stott
Diet quality: do hares eat a higher quality diet than rabbits?	Phil Stott
Manipulation of foetal skin development using nutritional supplements	Phil Hynd
Investigation of spina bifida in a sheep model	Stefan Heindleder
Insulin-like growth factor 2 receptor nucleotide sequence variation and imprinting in fetuses with <i>Bos indicus</i> and <i>Bos taurus</i> genetics	Stefan Hiendleder
Novel probiotic-based treatment for intestinal disease	Gordon Howarth
Prenatal immune response in colostrums and serum of mares	Chris Riley
Evaluation of betaine as a supplement to pregnant ewes: effects on lamb birth weight and maternal performance	Phil Hynd
A study of the optimal methods for euthanasia in zebrafish	Susan Hazel
Does supplementing lactation diets with arginine increase milk production, progeny growth and survival in pigs?	Will van Wettere
Puppy preschools in Adelaide	Susan Hazel
The effects of feeding alternative protein sources on the intestinal mucous layers in yellowtail kingfish	Bec Forder
Avian influenza	Farhid Hemmatzadeh