II SVS Research Conference 2016

Program & Abstracts

Sponsored by:

- IDEXX Laboratories
- VetPrac
- Wildlife Health Australia
- Australia Zoo
- VeSPA (Veterinary Science Postgraduate Association)
PROGRAM - THURSDAY 27TH OCTOBER

8.30 – 9.00am – Coffee, Tea & Registrations

9.00 – 9.15am – Welcome and Introduction

9.15 – 9.45am – Key Note Speaker - Glen Coleman

9.45 – 10.30am – Theme: Livestock Production

9.45 – 10.00am – Association of elevated emotional state with thermal imagery in the dairy cow. Jashim Uddin.

10.00 – 10.15am – Increased expression of ATP binding cassette transporter genes following exposure of Haemonchus contortus larvae to a high concentration of monepantel in vitro is accompanied by increased tolerance to ivermectin. Ali Raza.

10.15 – 10.30am – Identification of livestock trade and marketing network by local livestock stakeholders in the Central Dry Zone of Myanmar. Tu Tu Zaw Win.

10.30 – 11.00 am – Morning Tea and Poster Viewing

11.00 – 12.00pm – Theme: Wildlife


11.15 – 11.30 am - The koala (Phascolarctos cinereus) in SE QLD: using passive surveillance to understand the decline of an iconic species. Viviana Gonzalez Astudillo.

11.30 – 11.45 am – Generation and characterization of the world’s only marsupial induced pluripotent stem cells (iPSCs) from adult Tasmanian devil (Sarcophilus harrisii) dermal fibroblasts. Prasana Weeratunga.

11.45 – 12.00 pm – Linking testosterone levels and breeding behaviour in migrating male humpback whales (Megaptera novaeangliae). Fletcher Mingramm.

12.00 – 1.15 pm – Lunch and Poster Viewing

1.15 – 2.15 pm – Theme: Undergraduate Talks

1.15 – 1.30 pm – Lateralized coping strategies in cattle responding to visual stressors. Andrew Robbins.

1.30 – 1.45am – Going the Distance: Identifying Better Vets on Admission. Joanna Sussex.

1.45 – 2.00 pm – A retrospective study of trap, neuter and return activities in Australia. Kuan Yew Tan.
2.00 – 2.15 pm – Studying the leukocytic response to canine soft tissue sarcoma, canine mast cell tumour and canine mammary tumour to support a novel cancer immunotherapeutic. **Philip Macpherson.**

2.15 – 3.30 pm – Theme: Companion animal & equine

2.15 – 2.30pm – Comparison of invasive versus noninvasive blood pressure measurements in anaesthetised dogs undergoing ovariohysterectomy using the Bionet BM7 and PetMAP Graphic devices. **Zoe Jacobs Fohrman.**

2.30 – 2.45pm – A pre-clinical trial using bio-material-based delivery of in vitro-derived mesenchymal stem cells to effect cartilage repair in a canine model of osteoarthritis. **Arash Shahsavari.**

2.45 – 3.00pm – Defining a ‘standard’ training program for the first 12 months of training a racehorse – a cross sectional survey of Australian Thoroughbred trainers. **Anita Barton.**

3.00 – 3.15 pm – Improving the detection and prognostication of canine haemangiosarcoma (HSA). **Patharee Oungsakul.**

3.15 – 3.30 pm - The role of cancer stem cells in the pathogenesis of preneoplastic and neoplastic prostatic lesions in dogs and as a potential target for anti-cancer therapy. **Michelle Story.**

3.30 – 4.00 pm – Afternoon Tea Break

4.00 – 4.30 pm – Human Continuum – moderator: Dr Clive Philips – “Use of greyhounds in sports/entertainment”.

4.30 – 4.45 pm – Awards and Presentations

4.45 – 5.00 pm – Closing drink and poster viewing
LIST OF ORAL ABSTRACTS

Presenter’s name is underlined

Livestock/Production

Association of elevated emotional state with thermal imagery in the dairy cow

Jashim Uddin, Amira Goma, Clive Phillips and David McNeill

School of Veterinary Science, The University of Queensland, Gatton, Australia.

Cattle may experience elevated emotions of alertness, apprehension and stress due to rough handling by humans and their behaviours, climatic weather and change in diet, access to pasture, transportation and social grouping. Elevated emotions are indicated by elevated heart rate and can lead to reduced milk production, rumination rate, rumen contraction, rumen pH and increase the risk of subacute ruminal acidosis (SARA). A consequence of SARA is laminitis/lameness and therefore a need to cull otherwise superior cows. Elevated feelings of cows can be assessed by behavioural tests such as laterality or physiological tests such as cortisol analysis. Behavioural observations are labour intensive and require considerable cost in technical expertise and equipment e.g. lighting, video recorder and digital analysis software. Cortisol analysis is also expensive, time consuming, often confounded due to difficulties in obtaining true baseline levels and irregular sampling frequency which may miss rapid responses or be masked by circadian and ultradian rhythms of cortisol levels. Since elevated emotions occur due to stimulation of the hypothalamic-pituitary-adrenal axis and alter the blood circulation, it is hypothesised that there would be a change in thermal pattern in sensitive areas of the cow in response to emotional change. Such changes lead to substantial amounts of externally radiated energy that can be detect precisely by an infrared thermographic camera. This tool presents the opportunity for a non-invasive, passive, remote, rapid, and quantitative assessment of radiated heat patterns from the cow that is relatively cost-effective. The aim of this project is to determine which thermal patterns on the cow are best related to emotional state. A laterality test will be used as the measure of emotional state. The outcome will be that dairy farmers and their advisors will be able to use thermographic images to determine which of their cows need special husbandry attention.

Increased expression of ATP binding cassette transporter genes following exposure of Haemonchus contortus larvae to a high concentration of monepantel in vitro is accompanied by increased tolerance to ivermectin

Ali Raza1,2, Neil H. Bagnall1, Abdul Jabbar3, Steven R. Kopp3, Andrew C. Kotze1

1CSIRO Agriculture and Food, Queensland Bioscience Precinct, 306 Carmody Rd., St. Lucia, QLD 4067, Australia.
2School of Veterinary Science, University of Queensland, Gatton, QLD 4343, Australia.
3Faculty of Veterinary and Agricultural Sciences, The University of Melbourne, Werribee, Victoria 3030, Australia

Background: There is some evidence that ATP binding cassette (ABC) transporters play a role in resistance to anthelmintics, particularly against macrocyclic lactones. Some anthelmintics, including ivermectin (IVM), have been shown to induce transcription of multiple ABC transporters in nematodes; however, the effects of monepantel (MPL) on transcription of
these transporter genes has not been studied. **Methods:** Larvae of two MPL-susceptible isolates of *Haemonchus contortus* were exposed to MPL at two concentrations (2.5 and 250 µg/mL) for periods of 3, 6 and 24 h. Transcription levels of sixteen ABC transporter genes were measured at the end of the incubation periods. The consequences of MPL exposure were examined by measuring rhodamine-123 efflux from the larvae, and their sensitivity to subsequent treatment with IVM or levamisole. **Results:** Multiple ABC transporter genes showed significantly higher transcription in both worm isolates following exposure to MPL at 250 µg/mL for 3, 6 or 24 h, particularly the P-glycoprotein (P-gp) genes pgp-11, pgp-12 and pgp-14. Of these, only pgp-11 maintained the elevated levels 24 h after the end of the drug exposure period. In contrast, there was only a single instance of low-level upregulation as a result of exposure to MPL at 2.5 µg/mL. Larvae exposed to MPL at 250 µg/mL showed an increased efflux of rhodamine-123 and a proportion of the larval population showed an ability to subsequently tolerate higher concentrations of IVM in migration assays. There was no increased tolerance to IVM following pre-exposure to MPL at 2.5 µg/mL. **Conclusions:** Exposure of *H. contortus* larvae to 250 µg/ml MPL results in increased transcription of multiple transporter genes and increased R-123 efflux. The subsequent ability of a proportion of the larvae to tolerate IVM suggests a protective role of ABC transporters across different chemical entities. However, these observations were only made at a concentration of MPL well above that experienced by parasitic life stages *in vivo*, and hence their significance remains unclear.

**Identification of livestock trade and marketing network by local livestock stakeholders in the Central Dry Zone of Myanmar**

*Tu Tu Zaw Win¹; Angus Campbell²; Ricardo Soares Magalhaes¹; Kyaw Naing Oo³; Joerg Henning¹*

¹The School of Veterinary Science, The University of Queensland, Gatton, Australia,  
²Faculty of Veterinary & Agricultural Sciences, The University of Melbourne, Melbourne, Australia  
³Livestock Breeding and Veterinary Department, The Ministry of Agriculture, Livestock and Irrigation, The Republic of the Union of Myanmar

The Central Dry Zone (CDZ) is one of the most important livestock production areas of Myanmar. This region supports 10 million people whose livelihoods depend on small-scale, dry-land agriculture, but it is also one of the poorest regions of Myanmar. Livestock production is a major income source for local different groups of stakeholders associated with livestock trading (hawkers, middlemen, branch collectors and traders) in the CDZ, but there is an eminent lack of information on livestock trading network and the current trading system in CDZ of Myanmar. Different groups of stakeholders associated with livestock trading (hawkers, middlemen, branch collectors and traders) who were working at bazaars, quarter markets, village markets and cattle markets were surveyed to summarize their sales and purchases, to identify reasons for marketing, the proportion of live and dead animals traded, prices according to seasons and species, to summarize the labour employed and payment methods used and to identify factors and constraints that influent prices and trading. In this project, quantitative survey techniques were used to compile data on livestock trading profile and livestock trading network from cattle, sheep and goat and village chicken stakeholders involving in the trading network in the CDZ of Myanmar. In addition stakeholders such as farmers, middlemen, hawkers and traders were interviewed on their attitudes and awareness towards animal diseases and towards cross-species disease transmission. Social Network Analysis and Spatial analysis are used to describe the whole market chain from farm to market...
level. Overall, this research project will help to understand the livestock trading and marketing network in the CDZ to develop efficient, reliable and relevant strategies to improve livestock production and health.

Wildlife

Past and Present Population Structure and Connectivity of Queensland Dugongs (*Dugong dugon*)

*Alex McGowan*

The dugong is a marine herbivore inhabiting shallow tropical and sub-tropical coastal waters extending from east Africa across to Vanuatu. Australia is considered a stronghold for the species. Threats to dugongs in Australia include loss of seagrass beds as a result of natural and human impacts, entanglement in fishing and shark nets, hunting and boat strike. Previous genetic studies of the central Queensland dugong population identified a genetic break in the population somewhere between Shoalwater Bay and Townsville, however a lack of data was unable to detect the location of the break. This projects aims to define the location of the possible genetic break and to determine the historical population structure of the central Queensland population and compare the findings with the previously studied southern Queensland populations. There are proposed port expansions in the central Queensland region potentially creating barriers to dugong dispersal. Information from this project will help determine if there are barriers to dispersal in the central Queensland region and how they are affecting the population structure of the dugong populations in the area and the impact future barriers to dispersal may have. This project also aims to determine the contemporary movements and social interactions of Queensland dugongs using ‘commensal bacterial networks’.

Can passive surveillance aid in the understanding of decline of an iconic marsupial? The koala in South East Queensland.

*Viviana Gonzalez-Astudillo¹, Rebecca Larkin², Allan McKinnon², Rachel E. Allavena¹, and Joerg Henning²*

¹ School of Veterinary Science, Building 8114, University of Queensland, Gatton, Queensland, Australia
² Moggill Koala Hospital, 55 Prior Pocket Drive, Moggill, Queensland, Australia

The koala (*Phascolarctos cinereus*) is a mediums-sized, iconic arboreal marsupial, symbol of Australia’s natural heritage. However, surveys have reported that the conservation of the species is threatened by habitat clearing, climate change, inbreeding depression, bushfires, diseases, and trauma. Since the 1990s, the population of koalas of South East Queensland (SEQLD) has experienced a significant decline, resulting in the listing of the species as vulnerable to extinction according to the Australian EPBC act 2012. For decades, several wildlife institutions have provided specialized hospital care to sick or injured koalas. Although data on submissions are collected, no epidemiological analyses had been conducted to quantify the causes of diseases and injury. The aims of the current study were to 1) quantify
causes of morbidity and mortality in SEQLD koalas retrospectively using a government-managed database (N=20,250) containing data on submissions between 1997-2013 and determine associations between outcome of submission (dead, euthanized, released) and demographic, temporal and spatial risk factors for each main diagnosis; 2) use space-time permutation models to identify clusters for chlamydioidis, motor vehicle traumas, and wasting; and 3) compile a prospective dataset on detailed causes of koala mortalities for the period 2013-2016 conducting standardised autopsies (N=526). Overall, trauma from vehicle collisions, chlamydioidis, and wasting were the leading causes of submission in both datasets, demonstrating the relative importance of these causes has prevailed overtime. Over the 17-year retrospective period, most koalas arrived dead, followed by euthanized and released individuals. Twelve significant clusters were detected, revealing high risk areas for koala disease and injury. Despite the limitations derived from using data from hospital submissions, passive surveillance provides a cost-effective and valuable source to describe potential diseases affecting wildlife populations over long periods.

Generation and characterization of the world's only marsupial induced pluripotent stem cells (iPSCs) from adult Tasmanian devil (Sarcophilus harrisii) dermal fibroblasts

*Prasanna Weeratunga*¹, Arash Shohsavari¹, Dmitry Ovchinnikov², Ernst Wolvetang², Deanne Whitworth¹

¹School of Veterinary Science, University of Queensland, Gatton, Queensland, Australia.
²Australian Institute for Bioengineering and Nanotechnology, University of Queensland, St Lucia, Queensland, Australia.

The study of marsupial biology has both intrinsic and comparative significance, and may serve to stem the further loss of marsupial diversity due to extinction of species. Induced pluripotent stem cells (iPSCs) are once differentiated cells that have been re-programmed to an embryonic stem cell-like state, providing a powerful research tool. We demonstrate the generation of Tasmanian devil (Sarcophilus harrisii) iPSCs (DeviPSCs), the world’s first marsupial stem cells, from adult devil dermal fibroblasts by lentiviral transduction of human transcription factors: OCT4, SOX2, KLF4, NANOG, c-MYC and LIN-28. DeviPSCs display typical colony morphology, high nuclear to cytoplasmic ratio and stain positively for alkaline phosphatase (AP). Moreover, DeviPSCs have reactivated endogenous POU5F1 (OCT4), SOX2, NANOG and POU5F3 (POU2) genes, retained a normal karyotype, and concurrently silenced all exogenous transgenes. Notably, expression of both POU5F1 and POU5F3 appears to reflect a naive state of pluripotency since both factors are known to be expressed by cells from the epiblast of marsupial pre-implantation embryos. Under culture conditions favoring differentiation, DeviPSCs readily formed embryoid bodies (EBs) and in vitro teratomas that contain derivatives of all three germ layers. Although DeviPSCs are dependent on leukemia inhibitory factor (LIF) to maintain pluripotency, basic fibroblast growth factor (bFGF) co-stimulates their proliferation. To date, DeviPSCs have been stably maintained for more than 30 passages. Thus, we have established the world’s first marsupial iPSCs which constitutes an important step towards the understanding of marsupial biology and pluripotency. Significantly, our DeviPSCs will be an indispensable asset for stem cell-based regenerative and anti-cancer therapies against Devil Facial Tumor Disease (DFTD) which has threatened Tasmanian devils with extinction.
Linking testosterone levels and breeding behaviour in migrating male humpback whales (*Megaptera novaeangliae*)

**Fletcher Mingramm¹, Dunlop, R.¹ and Keeley, T.²**

¹School of Veterinary Science, the University of Queensland, Gatton campus, Queensland, Australia 4343  
²School of Agriculture and Food Science, the University of Queensland, Gatton campus, Queensland, Australia 4343

With regards to behaviour, humpback whales (HWs) are perhaps the most well-studied large free-ranging cetacean, yet information on associated physiology is limited. As such, few studies have established links between physiological measures and specific behavioural traits, such as those associated with breeding (e.g. singing, direct competition). This study aims to utilize blubber hormone monitoring techniques to investigate how testosterone (T) concentrations vary in relation to season, behaviour and age class in male HWs. Blubber samples (n = 137) were collected between 2013-2016, from both east and west Australian HW populations, using a PAXARMS biopsy system. T concentrations were determined by enzyme-immunoassays (currently: n = 69). Blubber T levels (mean ± SE ng/g) were significantly higher in adults (2.021 ± 0.16) compared with sub-adults (0.93 ± 0.16), regardless of season (F(1,65) = 14.23, p <0.001). Adults displayed higher levels of T en route to tropical breeding grounds (north migration: 3.05 ± 0.30; south migration: 1.36 ± 0.084) (F(1, 65) = 50.80, p <0.001). Currently, no significant relationships exist between T levels and individual behavioural categories (e.g. singer, female-calf-escort); analysis of remaining samples will help in determining whether there are detectable differences, in blubber T levels, between animals displaying different behavioural states. This is the first study to examine physiological measures in relation to reproductive behaviours in HWs. Examining how T levels vary in relation to season and behaviour, will improve our understanding of the spatio-temporal extent of breeding activities and the function of specific behaviours.

**Small animal/Companion**

**Comparison of invasive versus noninvasive blood pressure measurements in anaesthetised dogs undergoing ovariohysterectomy using the Bionet BM7 and PetMAP Graphic devices.**

**Zoe R. Jacobs-Fohrman,** **Wendy A. Goodwin**

UQ VETS Small Animal Hospital, School of Veterinary Science, University of Queensland, Gatton, QLD 4343, Australia.

To measure the level of agreement between two non-invasive oscillometric blood pressure monitors, the Bionet BM7Vet monitor and PetMAP Graphic device, in comparison with invasive blood pressure monitoring in anaesthetised dogs. Twenty healthy female client-owned dogs scheduled for routine ovariohysterectomy enrolled in the study. Arterial blood pressure (ABP) was measured non-invasively via a cuff placed over the dorsal metatarsal artery and via a catheter in the contralateral dorsal metatarsal artery. Blood pressure measurements were retrospectively categorized into various blood pressure levels
(hypotension, normotension and hypertension). A total of 227 paired readings were obtained from the Bionet BM7 monitor and 177 paired readings from the PetMAP device. Comparison of the measurements was performed using the Bland-Altman method and were validated using guidelines set by the American College of Veterinary Internal Medicine Hypertension Consensus panel (ACVIM). Overall, the Bionet BM7 device underestimated the invasive blood pressure (IBP) in all pressure states as determined by the systolic, mean and diastolic arterial blood pressures (SAP, MAP and DAP respectively). MAP obtained by the BM7 monitor displayed the lowest bias during hypotension (0.17mmHg), normotension (-4.88mmHg), however was less accurate during hypertension (-11.94mmHg). The PetMAP Graphic device overestimated the invasive SAP (13.84mmHg bias) and MAP (7.36mmHg bias) during all pressure states. Both the PetMAP and Bionet BM7 device met the ACVIM criteria at most blood pressure states, however the limits of agreement for the PetMAP device were wider. Overall, the results demonstrate that the agreement between NIBP measurements and IBP satisfied the guidelines set by the ACVIM for all pressures obtained by the Bionet BM7 except for the precision of SAP readings, and for the precision and bias of SAP NIBP measurements from the PetMAP Graphic device. Most criteria set by the ACVIM consensus statement were met by both devices, suggesting that the MAP and DAP NIBP measurements obtained using the Bionet BM7 monitor and the PetMAP Graphic device are clinically acceptable alternatives to IBP measurements in healthy anaesthetised dogs undergoing ovariohysterectomy.

A pre-clinical trial using bio-material-based delivery of in vitro-derived mesenchymal stem cells to effect cartilage repair in a canine model of osteoarthritis

Arash Shahsavari1, Ovchinnikov, D.2, Wolvetang, E.2, Whitworth, D.1

1School of Veterinary Science, The University of Queensland, Gatton, Australia.
2The University of Queensland, Australian Institute for Bioengineering and Nanotechnology, Brisbane, Australia.

Stem cells have acquired an important role in cell-based veterinary therapeutics, particularly in the field of tissue engineering, owing to the growing significance of dogs in society and similarity in the pathophysiology of many diseases that affect both humans and dogs. Although commercial companies worldwide are producing stem cells, particularly for osteoarthritis (OA) in dogs, issues regarding the dose, route and method of administration of cells still need to be resolved. Furthermore, the precise mechanism by which stem cells affect the biochemical and structural status of diseased articular joints remains undefined. Mesenchymal stem cells (MSCs) are multipotent cells with strong propensity for differentiation into chondrocytes, osteoblasts and adipocytes. In dogs, MSCs are mostly collected from adipose tissue (AT-MSCs) and bone marrow (BM-MSCs). The major problems in this field relate to the invasive nature of the techniques used for the collection of the MSCs, the small fraction of the total cells harvested that consists of MSCs, and variability in MSCs quality between donors. Hence, an alternative method has been developed to generate MSCs from induced pluripotent stem cells (iPSCs) in laboratory conditions. Due to the inflammatory nature of OA, we examined the expression of anti-inflammatory factors by iPSC-MSCs in response to known inflammatory cytokines. Interestingly, we found that iPSC-MSCs express a range of immunomodulatory and anti-inflammatory cytokines at levels equal to, or greater than, those expressed by harvested AT-MSCs and BM-MSCs. Thus, our iPSC-MSCs are an ideal
candidate for further studies towards developing an OA treatment to alleviate pain and inflammation.

**Defining a ‘standard’ training program for the first 12 months of training a racehorse – a cross sectional survey of Australian Thoroughbred trainers**

*Anita J Barton¹, John Al-Alawneh¹, Lisa J Kidd¹*

¹School of Veterinary Science, Gatton

**Introduction:** Dorsal metacarpal disease (DMD) affects as many as 40% of 2-year-old race horses in Australia,¹ with trainers and veterinarians anecdotally reporting an incidence as high as 80%.² It has been shown that high or rapid accumulations of high-strain cyclical loading, such as galloping, increase the risk of DMD.³ For researchers investigating DMD there is no defined ‘standard’ training regimen that can be used to design research projects that best mimic industry practice. **Materials and Methods:** A cross-sectional survey was conducted to describe the knowledge, attitude and practices of Australian Thoroughbred trainers towards the first 12 months of training young racehorses. An email link to an online survey engine was sent to 2000 trainers Australia-wide. Training periods were split into 7 defined blocks of time and gaits were defined by standard speeds: evens (12m/s); gallop (14m/s); stretch out (16m/s+). Trainers were asked to report at each training period in an average training regimen a) whether a given gait was trained; b) over what distance a gait was performed; and c) how many days per week a gait was performed. Average weekly cumulative workload (CW) was defined by multiplying the speed of the gait by number of days the gait was performed. CW was compared with reported incidence of DMD. **Results:** 199 trainers completed the survey (response rate 10%). From data provided, we described a ‘standard’ training program for a young racehorse in the first 12 months of training. Most trainers did not introduce evens until weeks 5-8, gallop and stretch-out in weeks 9-12. Evens were trained 1-2 days/week, with distances varying from 400m-1000m. Gallop and stretch out were trained 1 day/week for distances of 400m-800m. CW was not affected by trainer class (p=0.718) or location of training establishment (p=0.878). Reported incidence of DMD was 74%. There was no significant effect of workload on incidence of DMD. **Discussion:** This survey allowed us to define a ‘standard’ Australian training program for 2-year-old horses that will assist stakeholders with designing appropriate training investigations that better mimic current industry practice. In this investigation there did not appear to be a link between workload and DMD, which may reflect inaccurate reporting by trainers.

**Improving the detection and prognostication of canine haemangiosarcoma (HSA)**

*Patharee Oungsakul¹, Caroline O’Leary¹, Michelle M. Hill², David Duffy³, and Helle Bielefeldt-Ohmann¹*

¹School of Veterinary Science, UQ Gatton Campus, ²University of Queensland Diamantina Institute, Translational Research Institute, Brisbane, ³Queensland Institute of Medical Research Berghofer, Herston, Queensland,
Visceral haemangiosarcoma (HSA) is a malignant tumor found commonly in the dog, especially certain breeds such as the Golden Retriever, Labrador Retriever and German Shepherd. It commonly arises in the spleen or metastasizes to the spleen from a primary liver or heart HSA. Diagnosis is hampered by several characteristics of the neoplasm, including late onset clinical signs, difficulties in differentiating splenic HSA from other types of splenic masses (e.g. hematoma, haemangioma, lymphoma) and the inherent risk of getting a diagnosis on the mass which requires taking a biopsy from the spleen or liver, both very vascular organs. The most common approach to differentiate HSA from other causes of splenic masses is by histopathologic examination of tissue samples obtained at splenectomy or post mortem. Neither provides a means of establishing a prognosis. To develop non-invasive diagnostic methods, candidate serum glycoprotein biomarkers that can distinguish between HSA and HSA-like conditions previously discovered using lectin magnetic bead array-coupled tandem mass spectrometry (LeMBA-MS) will be used.¹ This study will perform independent validation of selected candidate serum glycoprotein biomarkers, by evaluating their HSA tissue expression and abundance using lectin histochemistry and immunohistochemistry. Candidate markers that are produced by the tumour cells or tumour-associated stromal cells will be selected for future evaluation in independent cohorts. Additional planned investigations will focus on (i) genetic markers with the employment of deep sequencing of DNA derived from blood and tissue samples (HSA and normal tissues) and (ii) assessment of tissue biochemical composition using Fourier Transform Infrared Spectroscopy (FTIR).

The role of cancer stem cells in the pathogenesis of preneoplastic and neoplastic prostatic lesions in dogs and as a potential target for anti-cancer therapy

Michelle Story¹, Brett Stringer², Rod Straw³, Chiara Palmieri¹

¹. School of Veterinary Science, The University of Queensland, Gatton, QLD 4343, Australia
². QIMR Berghofer Medical Research Institute, Brisbane, QLD 4006, Australia
³. Brisbane Veterinary Specialist Centre, Brisbane, QLD 4035, Australia

Humans and dogs are the only species that develop spontaneous prostate cancer at a significant incidence, and, consequently, canine prostate cancer is often used as a model for human prostate cancer. Despite this, the pathogenesis of canine prostate cancer is poorly understood and there is no grading system that correlates tumour histology to biological behaviour. This has contributed to the disease’s poor prognosis by hindering the development of early detection tests and effective treatments. There is evidence to suggest that human prostate cancer is caused by cancer stem cells, but few studies have investigated the presence of cancer stem cells in canine prostate cancer. Our project will attempt to address these knowledge gaps. Using samples of canine prostate, we will create a grading system for canine prostate cancer, investigate the presence of preneoplastic prostatic lesions, and determine the cell of origin of preneoplastic and neoplastic prostatic lesions. We will also attempt to determine if cancer stem cells are likely to be the cause of canine prostate cancer by assessing the expression of stem cell markers in canine prostate samples and canine prostate cell lines, and by isolating and expanding stem cells from the cell lines. In addition, we will determine if the manipulation of cancer stem cells alters neoplastic cell growth by using CRISPR to create mutations in the genes encoding certain cancer stem cell markers in neoplastic canine
prostate cell lines, and by incubating the neoplastic cell lines with substances that inhibit stem cells. We have successfully created a neoplastic canine prostate cell line from a clinical sample, which we will use in these experiments, and we will also attempt to use CRISPR to produce gene mutations in a normal canine prostate cell line to create additional neoplastic cell lines.

LIST OF POSTERS

Livestock/Production

In search for biomarkers of pain and inflammation.

Priya Ghodasara¹, Paul Mills¹, Nana Satake¹, Pawel Sadowski², Steven Kopp¹.

¹ School of Veterinary Science, the University of Queensland, Gatton, QLD, Australia
² Central Analytical Research Facility, Queensland University of Technology, Brisbane, QLD, Australia

Cattle are routinely subjected to painful surgical husbandry procedures, such as castration and dehorning. Quantifying the effectiveness of pain relief interventions during these procedures is challenging, due to the subjectivity and complexity of pain perception in animals and the inherent tendency for prey species to suppress their behavioural responses. Therefore, there are obvious limitations in the use of behavioural observations and routine biochemical or immunological assays restricted to individual targets (e.g. plasma cortisol) for detecting and quantifying the response to pain and stress. One approach, increasingly used in human biomedicine, is to develop an array of plasma biomarkers, which collectively respond to a stimulus. Next generation mass spectrometry techniques, such as SWATH-MS, can be applied to quantitative profiling of proteins (proteomics), lipids (lipidomics) and metabolites (metabolomics) in an unbiased manner and enable simultaneous evaluation of hundreds to thousands of various markers in virtually unlimited number of samples and thus a more holistic representation of the physiological change. SWATH-MS analysis requires one off construction of spectral libraries which can be expanded as the project develops and shared between laboratories. In this study SWATH-MS approach has been applied to monitor proteins that form a part of the systemic response to pain and inflammation and are putative targets of analgesic drugs. We describe the development of the foundational data and tools that do not only permit more thorough understanding of pain and inflammation and evaluation of pharmacological formulas in cattle but also have a potential to advance veterinary medicine in a manner that has not been possible before.

Using the theory of planned behaviour to understand dairy farmer intentions to make improvements to their management of foot lesions causing lameness in dairy cows.

Kate J. Chaplin¹, John D. Wright¹, Ahmad R. Rabiee², Tamsin S. Barnes¹, ³

¹ The University of Queensland, School of Veterinary Science, Gatton, Australia
² Cow Signals Australia, Horsley, NSW 2530, Australia
³ The University of Queensland, Queensland Alliance for Agriculture and Food Innovation, Gatton, Australia
A number of strategies have been recommended to dairy farmers to improve the management of foot lesions causing lameness in their herds. However, it is not known whether dairy farmers have intentions to make changes to their farming practices. Without intentions, making changes is unlikely. Understanding the factors influencing dairy farmer decisions to change management is crucial to increase the success of future interventions. One approach to studying dairy farmer intentions is to use the social psychological framework, the theory of planned behaviour (TPB). The TPB proposes three psychological constructs: attitude, subjective norm and perceived behavioural control. Together, these are hypothesised to determine an individual’s intention to perform a given behaviour. In turn, these constructs are said to be determined by an individual’s behavioural, normative and control beliefs, respectively. The aim of this study is to determine which beliefs and constructs have the greatest influence on dairy farmer intentions to improve their management of foot lesions. This study will consist of two questionnaires. In the first questionnaire, 25 dairy farmers will be interviewed to elicit the modal salient beliefs of the target population. These beliefs will then be used to formulate indirect measures of the three constructs. These measures, along with direct measures, and measures of dairy farmer intentions, will be used in a second questionnaire, distributed to dairy farmers in south-east Queensland and north-east New South Wales. Associations between both beliefs and constructs and intentions will be assessed. It is anticipated that the outcomes of this study will provide a greater insight into what motivates and what inhibits dairy farmers from improving their management of foot lesions. This information can be used to develop strategies that appeal to dairy farmer beliefs, with the overall aim of improving dairy cow welfare.

Wildlife

Motivational information within vocalisations of humpback whales (Megaptera novaeangliae).

Dana A. Cusano, Michael J. Noad, Rebecca A. Dunlop

Both male and female humpback whales emit non-song ‘social sounds’, which are used for both within-group and between-group communication. While the broad function of these sounds has been determined, little is known about the function of specific sound types, or information encoded within these signals. This includes cues about static features such as body size and sex, and dynamic cues such as motivation level. This research will focus on investigating the potential information that can be derived from static and flexible features in social sounds from groups comprising of one, or more, male humpback whales escorting a female. Initially, changes in female vocal signals with the addition of an escorting male will be studied. With the addition of more males to the group, the intensity of interactions between group members tends to increase. These different behavioural contexts will provide the opportunity to study the function of sound types, as well as potential within-sound motivational information. The proposed research will utilise pre-existing datasets of southerly (poleward) migrating groups carrying out breeding behaviours. Additional field work will be based in the Great Barrier Reef and Tonga to obtain behavioural data and recordings of whales on two largely unexplored breeding grounds. The use of different types of social vocalisations will be compared between ‘competitive’ and ‘passive’ groups as well as during
joining and splitting of animals. Acoustic features from these calls will be measured to determine if there is motivational information encoded within these vocalisations. This will be one of the first studies in marine mammals to investigate such flexible features of vocal signals. With the increasing levels of anthropogenic noise in the oceans, there is a high potential for this type of information to be lost if acoustic characteristics are masked by shipping noise.

**Network analysis as a promising tool for disease ecology.**

*Tatiana Proboste¹,², Nicholas Clark¹, Paloma Corvalan², Anne Goldizen², Hawthorne Beyer³, and Jennifer Seddon¹*

¹ School of Veterinary Science, The University of Queensland, Gatton QLD 4343, Australia  
² School of Biological Science, The University of Queensland, St Lucia, QLD 4072, Australia  
³ Centre for Biodiversity and Conservation Science, The University of Queensland, St Lucia, QLD 4072, Australia

The association of individuals within their social network can provide pathways for the spread of pathogens and parasites. Although social network analysis could have an important role in monitoring disease outbreaks or transmission of pathogens, few studies have investigated the relationship between social network structure, parasite prevalence, and dispersal among populations in wild animals. Understanding these relationships provides a promising tool to predict the dispersal behaviour of pathogens in wild populations. In fact, individuals highly connected in the transmission network would be a potential super-spreader. The objective of this study is to evaluate a simple and low cost method to construct a transmission commensal bacterial network to detect individuals with higher possibility to spread a disease using as a model an eastern grey kangaroo population in Sundown National Park, Queensland. The network is constructed based on two main components, “nodes”, representing an individual animal, and “edges” representing a relationship between them, where if two individuals share similar genetic subtype of bacteria, then transmission can be inferred. Fresh faecal samples were collected (2014-2015) and stored in glycerol at -80°C. Using a selective agar for *Escherichia coli*, 3-10 colonies were isolated from each sample. DNA was extracted from cultured cells and the presence of the bacteria confirmed by a PCR amplification of the uspA gene following by electrophoresis, and BOX-PCR to determine the genetic subtypes. We determined different bacterial subtypes per sample. Our results will be compared with a previous behavioural study in the same population to determine if this transmission commensal bacterial network based on *E. coli* genotypes is consistent with the animals’ social association network. If these networks are similar, we could have a faster and low cost tool to determine relationships among a wild population and, for example, identify super-spreaders in the population or barriers to animal movement.
Companion animals

Immunolocalization of Connexin43 (Cx43) Protein in the Normal and Diseased Canine Cornea.

YN Vu*, N Hamilton2, DJ Whitworth1, CR Green3, and JD Wright1

1 School of Veterinary Science, The University of Queensland; 
2 Institute for Molecular Bioscience, The University of Queensland; 
3 Department of Ophthalmology, The University of Auckland; 
4 Nong Lam University Ho Chi Minh city

Purpose: Connexins are proteins that form gap junctions (GJ) and hemichannels. Connexin43 (Cx43) gap junctions are involved in intercellular communication and have been identified as influencing the degree of fibrosis that accompanied the cornea healing process. Cx43 hemichannels play a role in inflammation and persistence of the inflammatory state in many tissues results in excessive fibrosis. The aim of the study was to identify the expression and the localization of Cx43 gap junction protein in normal and diseased canine corneas. Methods: Confocal laser scanning microscopy (CLSM) was used to obtain z-stacks of immunohistochemically labelled and nuclear stained corneal cryosections. Immunoflourescence of anti-Cx43 antibodies was measured using ImageJ software. Cx43 protein expression was quantified as the number ratio (GJ number/keratocyte) and average dot volume per nucleus (GJ volume in pixels/keratocyte). Results: Cx43 protein was expressed in all normal corneas, particularly in the basal layers of the epithelium. Expression was less in the stroma and absent in the endothelial cells of Descemet’s membrane. Cx43 protein expression (both number ratio and average dot volume) was considerably increased in all diseased versus normal corneas. Conclusions: Cx43 protein expression was upregulated in diseased canine corneas providing support for the hypothesis that targeting Cx43 gene and protein expression may benefit corneal repair.

The role of bladder biopsy in the diagnosis of canine and feline interstitial cystitis.

Emily Jones*, John Al-Alawneh, Chiara Palmieri, Karen Jackson, Mary Thompson and Rachel Allavena

Background: Interstitial cystitis (IC) is a debilitating inflammatory bladder wall disease in humans. It occurs similarly in cats, making them ideal models for further investigation of human IC. Histopathology is used to help diagnose IC in people, however the literature on veterinary bladder biopsy is sparse. The use of grading schemes has been shown to improve pathologist assessment of other organs, and it is hypothesised that a bladder wall grading scheme will help to align veterinary pathologist interpretation of bladder biopsies. Aims: To describe the role of bladder biopsy in diagnosing IC in suspected cases. Cases: Bladder wall biopsies submitted to the School of Veterinary Science Veterinary Laboratory Services, University of Queensland between 1982-2016 will be screened for eligibility and inclusion in this retrospective study. All eligible biopsies will undergo H&E and toluidine blue staining for histological evaluation. Methods: Eligible biopsies will be grouped as neoplastic, infectious, or inflammatory bladder disease cases. All cases with inflammatory disease will be assessed for histopathological variables, animal-level risk factors such as species, gender and age, and
if present, urinalysis and blood test results. **Results:** Expected in 2017. We hypothesise that there will be histological associations in inflammatory bladder wall disease that can be used as predictors of IC, and that a bladder wall grading scheme will help align veterinary pathologist interpretation of bladder biopsies and aid in IC diagnosis. **Conclusions:** This work will help define IC in veterinary patients, and evaluate pathologist concordance with and without the use of a grading scheme. The identification of confirmed IC in cats or dogs could lead to their use as an IC disease model for human research, and help manage this painful disease in veterinary patients.

**Notes:**
Notes:
Thank you all to our sponsors!