Faculty Day

20 August 2015

Research Overview

Prof Graham J Louw
Division of Clinical Anatomy and Biological Anthropology, Department of Human Biology, Faculty of Health Sciences, University of Cape Town

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Veterinary Science

Fakulteit Veeartsenykunde
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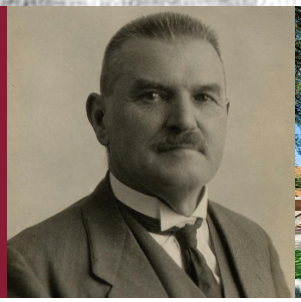

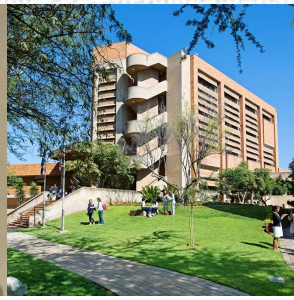

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Brief history of Faculty Day

Faculty Day of the amalgamated Faculty of Veterinary Science reflects a proud tradition, which had been nurtured by the original faculties of Veterinary Science of both Medunsa and the University of Pretoria, of showcasing the research activities of staff and students on a special, dedicated occasion.

Since the inception of the Faculty of Veterinary Science at Medunsa in the early 1980s, the staff, and later students, were involved in the activities of the "Academic Day", which was aimed at highlighting the research activities of the University, as well as exposing young researchers to a conference environment.

The Faculty of Veterinary Science of the University of Pretoria at Onderstepoort followed this trend shortly thereafter and the first "Faculty Day", which focused on the research activities of the Faculty, was held on 5 September 1984, sponsored by the then Dean, Prof JMW le Roux. The combined research skills of the two original institutions are today reflected in the proceedings of the Faculty Day held each year in the spring at the Onderstepoort Campus.

Sponsorships

The Faculty of Veterinary Science wishes to express its sincere thanks to the following sponsors for their very generous contribution in support of the 2015 Faculty Day.

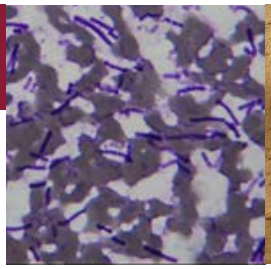
Faculty Day

Faculty of Veterinary Science
University of Pretoria

20 August 2015



Contents/Programme




08:00 – 08:25 Registration and coffee in the foyer of the Arnold Theiler Building

Master of Ceremonies: Prof André Ganswindt

08:30 – 08:45 Welcoming and opening address: Prof Darrell Abernethy, Dean of the Faculty of Veterinary Science

08:45 – 10:00

First Session Chairperson: Prof André Ganswindt

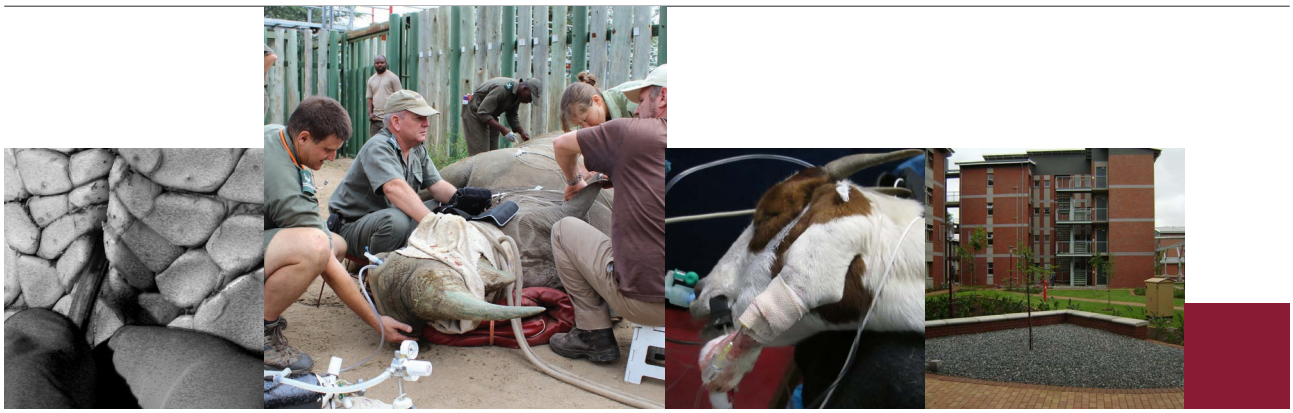
10:00 – 10:45 Tea (New Cafeteria)

10:45 – 11:45 Second Session

Second Session Chairperson: Prof Darrell Abernethy

Sir Arnold Theiler Memorial Lecture: Prof Graham Louw

11:45 – 13:30 Third Session (New Cafeteria)



Third Session

Poster session and finger lunch

13:30 – 14:45 Fourth Session

Fourth Session Chairperson: Prof Herman Groenewald

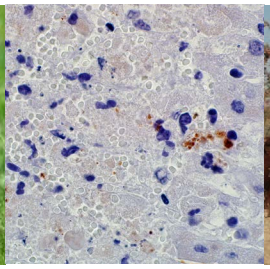
1. **Can plants used in ethnoveterinary medicine in southern Africa be a source of new compounds for the control of pests and parasites?**
   L Mukandiwa *12*
2. **A comparison of 4% modified fluid gelatin and 6% hydroxyethyl starch on haemodilution, colloid osmotic pressure, haemostasis and renal parameters in healthy ponies**
   Z Gratwick *13*
3. **Using a passive mouse protection model as substitute for direct lethal anthrax challenge in target animals**
   OC Ndumnego *14*
4. **The scale pattern of the front limb and interscapular region of Temminck's pangolin (*Smutsia temminckii*)**
   C Steyn *15*
5. **Do foetal biometric measurements in late gestation have potential in predicting readiness for caesarean section in dogs?**
   KGM De Cramer *16*

14:45 – 15:05 Guest presentation

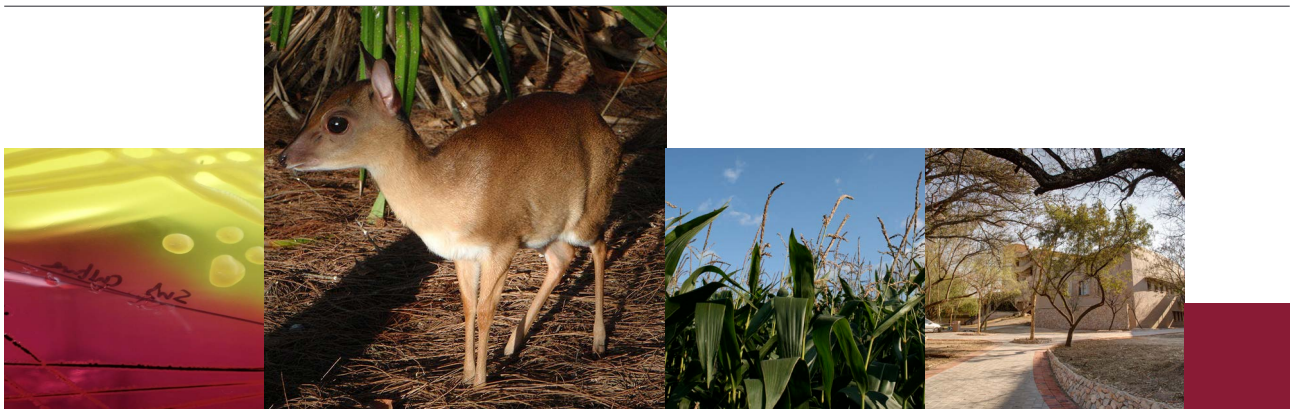
15:05 – 15:15 Faculty Day Awards: Prof Vinny Naidoo

Researcher of the Year
Young Researcher of the Year
Best oral presentations
Best poster presentations
Two book presentations

15:15 Coffee/tea and snacks (New Cafeteria)

POSTER PRESENTATIONS



Message from the Dean

The Faculty of Veterinary Science subscribes strongly to the University of Pretoria's objective of being a research-intensive institution as measured by the quality of the publications, master's and doctoral graduates it produces. The University's initiatives to identify unique research strengths and develop multidisciplinary research groups around these strengths are already contributing to the process of recognising and promoting excellence in research. The enhancement of innovative and relevant research and high-quality postgraduate training therefore remains an integral part of the Faculty's strategic plan.

Prof Darrell Abernethy,
Dean: Faculty of Veterinary Science

The Faculty has demonstrated an upward trend in research outputs since 2006, producing over 100 publication units in ISI-accredited journals for the first time in 2014, and graduating 13 PhD students in 2015, another record. Maintaining this momentum will take teamwork, dedication and a strategic approach to research. and we welcome the new Deputy Dean, Prof Vinny Naidoo, who will lead this initiative.

An efficient research programme in the Faculty must remain relevant to the needs of South Africa, further develop its links within Africa, and build its international network. An important element will be the development of strong, productive research groups that will support UP's 2025 Vision, and which can serve as the basis for Faculty growth and development. Such groups will contain a mix of senior, internationally recognised researchers, developing researchers, postdoctoral personnel and postgraduate students. Emphasis will be on the Faculty's existing strengths and developing groups that will contribute to both the international ranking of the Faculty and the University's ranking and vision. At the same time, they must have the potential to generate high-impact publications and attract more postgraduate students nationally and internationally. Several potential groups have already been identified, including wildlife, infectious diseases, One Health and epidemiology, and more may be added.

Local collaboration is also essential to research, and closer collaborative research between the Onderstepoort Veterinary Institute (OVI), Onderstepoort Biological Products (OBP) and the Faculty will be at the forefront of planning for the next year. The vision of a so-called OP Complex, incorporating the three institutions and possibly other departments of the University of Pretoria, to serve as a research hub for livestock production and health in South Africa and beyond is not unrealistic and will be actively explored.

Paramount to the future of the Faculty will be the growth in South African veterinary researchers. An active programme of recruitment among our graduates and those from Medunsa has commenced.

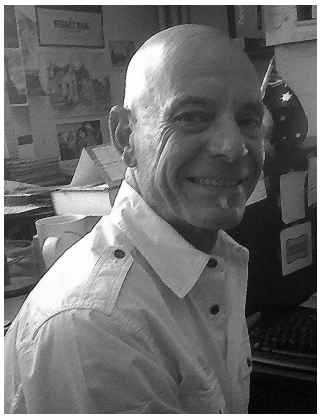
We are proud of what we have achieved over the last few years. There were many highlights, and we can indeed be pleased with our progress. However, our quest is to be perceived as a highly productive, world-class veterinary seat of excellence. We will therefore always be faced with new challenges in ensuring that we are locally relevant to the challenges of animal health, poverty and food security in southern Africa, while at the same time making an impact internationally with cutting-edge research and high-level collaborations and networks.

Faculty Day provides an opportunity for our researchers to present the results of their studies and share them with their peers. This has become a proud tradition, stretching over a period of more than 30 years. My wish is that Faculty Day 2015 will indeed further provide impetus to our Faculty's pursuit for excellence and distinction in support of the University's research-intensive vision.

This year's Sir Arnold Theiler Memorial Lecture is delivered by Prof Graham J Louw from the Department of Human Biology in the Faculty of Health Sciences, University of Cape Town (UCT). After graduating from this Faculty in 1976, Prof Louw joined the Department of Anatomy as a senior lecturer in 1980, and obtained his DVSc in 1987. In 1989, he joined the then Faculty of Medicine of UCT. His lecture focuses on the interesting topic of mummification and the sociocultural aspect of the preservation of the bodies of domesticated animals, taking us right back to the practice of mummification by the ancient Egyptians. He describes modern imaging techniques that have enabled scientists to explore what lies hidden beneath the layers of mummified remains, and will share some research goals and veterinary practices of the time.

It is a pleasure to welcome not only Prof Louw, but also all the visitors, staff members and students attending this year's event. May Faculty Day again serve as an inspiration to all of us in pursuing the Faculty's overarching research goals by sharing new scientific conclusions, new ideas and innovative concepts. Congratulations also to the Faculty's Research Award winners for 2014. A special word of gratitude goes to the Faculty Day Organising Committee for making this event possible.

Curriculum Vitae:
Prof Graham J Louw



Prof Graham J Louw

Graham Louw was born in Cape Town, attended primary school in Durban and matriculated at Pretoria Boys' High School. He then went on to complete his BVSc degree at the University of Pretoria in 1976. From that time until 1980, he was involved in locum work around the country and completed two years of compulsory national service as a veterinarian. His work in the Defence Force took him to Potchefstroom (Equestrian Centre), Keetmanshoop (State Veterinary Services), Ovamboland (Equestrian and Dog Training Centres), Pretoria (Equestrian Units and Dog Training Centres), and De Aar (Equestrian Breeding Farm). He was in private practice in Pretoria, Johannesburg, Vereeniging, Durban, Port Elizabeth and Cape Town.

In 1980, Graham joined the Department of Anatomy in the Faculty of Veterinary Science at the University of Pretoria as a senior lecturer. His main roles were teaching comparative anatomy to undergraduates and conducting research, particularly in neuroembryology and neuroanatomy. In 1987 he was awarded his DVSc by the University of Pretoria for a thesis entitled "The development of the arterial blood supply to the bovine brain in association with the developing brain".

The year 1989 found Graham back in Cape Town when he joined the Department of Anatomy and Cell Biology in the Faculty of Medicine at the University of Cape Town, as a senior lecturer. In 2000, he was promoted to Associate Professor and Full Professor in 2009. The Faculty later changed its name to better reflect the diversity of the undergraduate student body and became known as the Faculty of Health Sciences. The structure of the Department also underwent several changes, and he is now Head of Division: Clinical Anatomy and Biological Anthropology of the Department of Human Biology, and is Deputy Head of Department.

Graham was awarded a Distinguished Teacher's Award by UCT in 2003, and in 2011 he was inducted as an honorary member of the Golden Key International Honour Society (University of Cape Town Chapter).

Between 2005 and 2010, he focused on the course work required for a Postgraduate Diploma in Higher Education through the Centre for Higher Education Development at UCT, upgrading this to a Master's in Higher Education Studies. He was awarded his MPhil in 2010 for a thesis entitled "Conceptualising differentiated forms of knowledge: the medical (MBChB) curriculum of the University of Cape Town". In 2013, he obtained a Certificate of Merit for Assessment in Higher Education on the Quality of Teaching in a Higher Education Programme of the Cape Higher Education Consortium.

Graham has been the local editor (for Africa and the Middle East) of *Clinical Anatomy* (the official journal of the American Association of Clinical Anatomists) for the last six years. He has been a member of various committees at UCT, such as the Chair of the Animal Ethics Committee (FHS), Co-Chair of the MBChB Programme Committee, Senate Admissions Review Committee, Board of the Centre for Higher Education Development Board, Senate and similar formal bodies. He is currently assisting the South African Bureau of Standards (SABS) with the revision of the South African National Standard (SANS) for the ethical use of animals in research. He has been an active member of the Anatomical Society of Southern Africa for 35 years, serving long periods of time as Honorary Treasurer and President. This role has resulted in his chairing several organising committees for both local and international conferences.

Teaching and learning have always featured prominently in Graham's life, and he thoroughly enjoys working with young people and watching them grow into excellent health care professionals. His final years at UCT will be spent developing and convening the new Graduate Entry Programme for the MBChB degree at UCT.

Sir Arnold Theiler Memorial Lecture

Mummification – a glimpse into the sociocultural aspects of the preservation of the bodies of domesticated animals.

Prof Graham J Louw

Division of Clinical Anatomy and Biological Anthropology, Department of Human Biology, Faculty of Health Sciences, University of Cape Town; Email: Graham.Louw@uct.ac.za.

The practice of the mummification of human remains by the ancient Egyptians is well known to most people. The Egyptians believed that a person or animal could not live after death without their body being preserved in this way. The presentation initially gives an overview of the biopsychosocial and spiritual cultural practice of mummification, as well as explaining how mummification was performed.

The main portion of the presentation covers the range of animals used for mummification by the Egyptians and explains why these species were chosen. The Egyptians did not worship animals – they used them in their votive offerings and prayers, as they were seen to be channels to the gods of their civilisation.

Modern imaging techniques have enabled scientists to explore what lies hidden beneath the covering layers of mummified remains, as well as to gain insight into what is contained in a sarcophagus without having to open the casket. For closing comments, some research goals are covered such as investigations into animal husbandry, veterinary practices of the time, and species of animals that have since become extinct.

Sir Arnold Theiler Memorial Lectures

1984:	T Gutsche	"Theiler – his personal significance today"
1985:	Prof HPA De Boom	"Vlammende fakkels, ou bene, ivoortorings en rooi vlae"
1986:	Prof BC Jansen	"Theiler-gedenklesing"
1987:		Opening of the Sir Arnold Theiler Building – no lecture
1988:	Dr RD Bigalke	"Important research requirements for future animal production-orientated research with particular reference to veterinary science"
1989:	Dr R Swanepoel	"The joy of research"
1990:	Dr A Schutte	"The impact of controlled breeding on the cattle industry in southern Africa"
1991:	Prof DM Joubert	"Sir Arnold Theiler-gedenklesing – Theiler en die Fakulteit Veeartsenykunde"
1992:	Dr CM Cameron	"The environment – whose responsibility?"
1993:		Opening of the Onderstepoort Veterinary Academic Hospital – no lecture
1994:	Dr W Plowright	"Rinderpest and cell-culture revolution"
1995:	Prof WL Jenkins	*
1996:	Prof PV Tobias	"Premature discoveries in science"
1997:	Prof DL Block	"Our universe: accident or design?"
1998:	Prof TW Naudé	"A stroll through the wondrous garden of South African toxicology"
1999:	*	*
2000:	Dr DW Verwoerd	"The molecular revolution in biology and its influence on veterinary science"
2001:	Prof H Huismans	"Molecular biology and its impact on the study and control of viral diseases such as bluetongue and African horse sickness"
2002:	Prof I Horak	"The joy of research"
2003:	Prof WFO Marasas	"Fumonisins: historical perspective and future objectives"
2004:	Dr RA Kock	"Wildlife domestic animal disease interface – hard or soft edge?"
2005:	Prof SS Van den Berg:	"The past, present and future of the clinical departments in the Faculty of Veterinary Science"
2006:	Dr BD Perry	"The global poverty reduction agenda: what are the implications for animal health research and development?"
2007:	Prof Dr AWCA Cornelissen	"What makes an excellent Faculty of Veterinary Medicine?"
2008:	Dr G Brückner and	"New challenges for the veterinary profession in global animal disease control the trade in animals and animal products"
2009:	Prof P Doherty	"Adventures in infection and immunity"
2010:	Dr R Moerane	"The role of the veterinary profession in the current developmental agenda in South Africa."
2011:		World Veterinary Congress in South Africa – no Faculty Day
2012:	Prof NJ MacLachlan	"Emerging viral diseases: the example of bluetongue, from Theiler to climate change"
2013:	Prof MC Horzinek	"A personal journey through coronavirus evolution"
2014:	Prof Louis J Guillette Jr	"Predisposition for health or disease: the 'new' genetics of environmental health"

** We apologise that the above list is not complete. It will be appreciated if anyone who has access to some of the missing information contacts Mr Chris van Blerk (chris.vanblerk@up.ac.za or 012 529 8436)

Research Summary: 2013–2015

The enhancement of innovative and relevant research, as well as high-quality postgraduate training, remains an integral part of the Faculty's strategic plan. In support of the University's goal to become a research-intensive institution, this requires increasing research outputs through effective postgraduate programmes, and making research a primary thrust in order to focus our research programmes on unique South African animal disease problems.

The upward trend and sustained growth in research outputs, the quality of ongoing research and facilities, and the engagement of many personnel with the UP vision, suggest that the Faculty is well placed to contribute significantly to the strategic goals of the University. The Faculty's research publication output increased from 55,3 units in 2006 to 101,87 in 2014 (ISI-accredited journals). Subsidy units earned for scientific articles published in 2013 led to a research budget for 2015 of R1 919 530.

Postgraduate students make up 22.6% of the total student body. The number of postgraduate graduations continues to increase compared to previous years. Challenges to sustaining these increases include the clinical nature of academics' work in some departments, the percentage of academics with doctoral degrees (44%) or NRF ratings (25%) and the percentage supervising postgraduate students (52%). Plans are underway to increase these percentages over the next one to three years and to recruit additional postdoctoral researchers and research fellows to boost research.

The Faculty is training professionals that are able to protect animal health, which also impacts on human health, thereby stimulating economic growth and food security. An efficient research programme must remain relevant to the needs of South Africa, but also remain relevant to a constantly changing environment. Therefore, a strong research platform will be explicitly pursued as the basis for faculty growth and development. Research groups will be identified and developed that will support UP's 2025 Vision and current research clusters, and will be relevant to the country's needs. At the same time, it must have the potential to generate high-impact publications, attract more postgraduate students nationally and internationally, and increase the research status of the Faculty. Its vision is thus to have strong internationally recognised research groups in wildlife, infectious diseases, One Health, epidemiology and veterinary public health. Fundamental to these visionary requirements, the Faculty currently operates within the following research focus areas:

Molecular studies on infectious and parasitic diseases of animals

A research focus utilising biotechnology for the development of improved diagnostic techniques and vaccines for animal diseases and for the study of their pathogenesis.

Phytomedicine and ethno-veterinary medicine

An established multidisciplinary and collaborative research programme focusing on the development of extracts from plants with antimicrobial or anti-parasitic activity purposes.

Wildlife and environmental health

An inclusive research focus with contributions from all five departments of the Faculty, including studies on tuberculosis in buffalo, immune-contraception in elephants, theileriosis in roan and sable, the toxicity of non-steroidal anti-inflammatories in vultures and endocrine disruptors in the environment.

Veterinary aspects of food safety and food security

An established research focus that includes, inter alia, programmes in veterinary public health, community development, epidemiology and risk assessment, and poultry health.

Equine and companion animal health and welfare

A focus on infectious and other diseases of horses and other companion animals with an important impact on trade and sports medicine (the racing industry) or on the welfare and management of these animals.

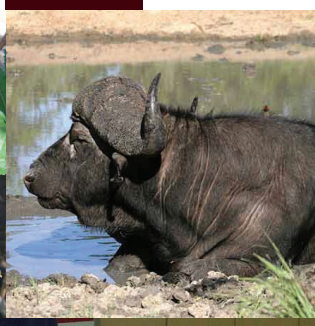
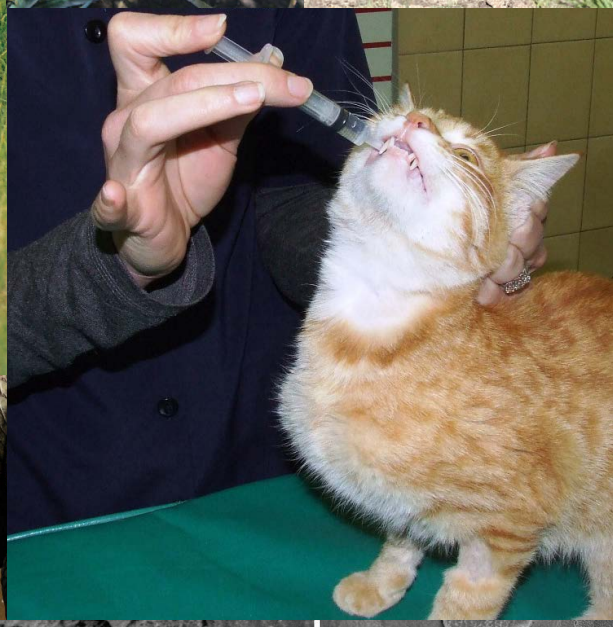
An Exotic Leather Research Centre (ELRC) has recently been established to serve as technical collaborator for the Department of Trade and Industry (dti)-approved sub-National Exotic Leather Cluster, funded by the Industrial Development Corporation (IDC). Over the next five years, the Centre will be developed as a Centre of Excellence in collaboration with the University's Faculty of Natural and Agricultural Sciences, responsible for research, postgraduate training and services to improve the global competitiveness of the South African exotic leather and leather goods industry, specifically focusing on research pertaining to crocodile and ostrich health and production, and exotic leather and leather goods marketing and trade. The Centre has great potential to significantly boost research outputs, attract international interest and collaboration, and contribute to economic and social development.

In 2013, the first round of funding for research on the control of animal diseases by the Tshwane Animal Health Biocluster was initiated. In this regard, the Faculty has eight registered, successful and ongoing research projects for a total of more than R23 million until 2016, which gave the Faculty's research effort a substantial boost.

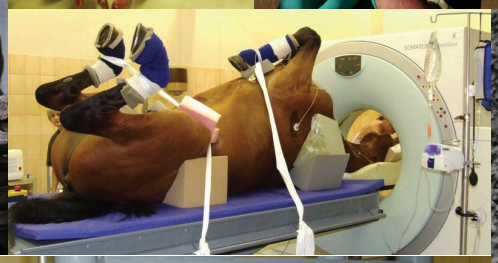
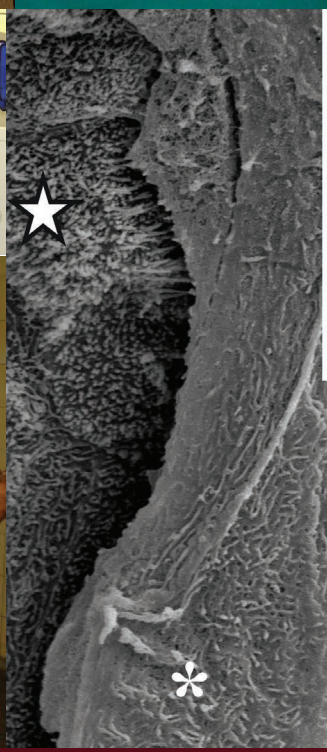
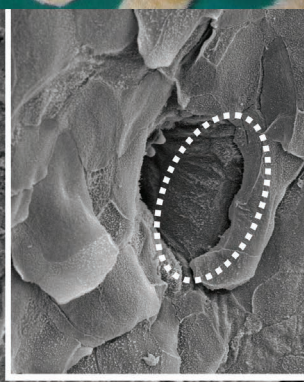
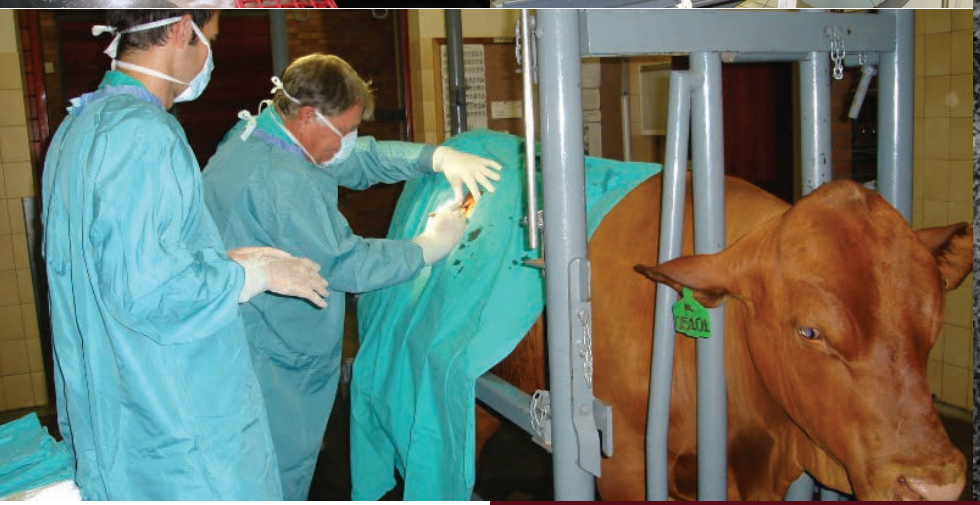
Research output and growth

Measures to increase the Faculty's research output could, inter alia, be achieved by establishing a research ethos, increasing the numbers of postgraduate students and



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Research Summary: 2013–2015 (continued)

encouraging teaching staff to submit themselves to National Research Foundation (NRF) rating. The Faculty's growth and progress in support of the University's strategic direction could be measured when compared to research outputs over preceding years. It is useful to evaluate the success of the Faculty by providing certain figures relating to the growth in the number of master's and postdoctoral students, research publication outputs and the number of NRF-rated researchers in the Faculty.

The number of staff members with doctorates increased from 21.1% in 2005 to 44% in 2014. There was a growth of more than 49% in the combined number of master's and doctoral students, and the Faculty more than doubled its postgraduate output and number of postdoctoral students. Eight PhDs were awarded in 2014 and 13 were awarded in 2015 (four in the upcoming Spring Graduation Ceremony), the highest number the Faculty has had in one year.

The number of NRF-rated researchers in the Faculty's staff complement has shown a steady growth, reaching 30 in 2015, compared to 27 in 2014, and nine in 2005. The Faculty now has nine B-rated, 16 C-rated and five Y-rated staff members.

In 2014, a new policy was adopted by the Faculty's Research Committee (Rescom) for the allocation of research grants funded by its Research Fund, which constitutes 20% of the total allocation for research to the Faculty by the University. This amount is based on the subsidy paid by the Department of Higher Education and Training for scientific publications in 2012. It is thus a reward for scientific productivity, The Rescom Fund is aimed at assisting promising new academic staff to develop their research skills and productivity. Young non-established staff members who have been permanent members for less than five years can apply for three years of support, whereas new established scientists qualify for a one-year bridging allocation. In 2014, five allocations of R50 000 each were made to five academic staff members.

Funding allocated for postgraduate bursaries amounted to R655 800 in 2014, which was sufficient for 27 PhD and MSc scholarships. About 100 new research protocols were registered in the Faculty during the course of 2014, compared to 82 in 2012.

Faculty Day 2014 and research awards

The annual Faculty Day in 2014 provided an opportunity for our researchers to once again showcase the research activities in the Faculty to colleagues and peers, and was well attended by staff members, visitors and sponsor companies alike.

The prestigious Sir Arnold Theiler Memorial Lecture was delivered by Prof Louis J Guillette Jr, Professor of Obstetrics and Gynaecology at the Medical University of South Carolina, USA and also Endowed Chair and Director: Center for Marine Genomics, Hollings Marine Laboratory. The title was "Predisposition for health or disease: the 'new' genetics of environmental health". His well-received lecture appropriately illustrated the commitment of this Faculty to international association and collaboration with experts globally.

Excellence in research performance was recognised at the event by the identification of the Faculty's Top 10 researchers and the allocation of the following research awards:

Researcher of the Year

Prof Peter Thompson
(Department of Production Animal Studies)

Young Researcher of the Year

Dr Gareth Zeiler
(Department of Companion Animal Clinical Studies)

Nine top researchers in the Faculty

Prof Geoff Fosgate
Prof Anita Michel
Prof Andre Ganswindt
Prof Robert Kirberger
Prof Estelle Venter
Prof Vinny Naidoo
Prof Johan Schoeman
Dr Dayo Fasina
Prof John Soley

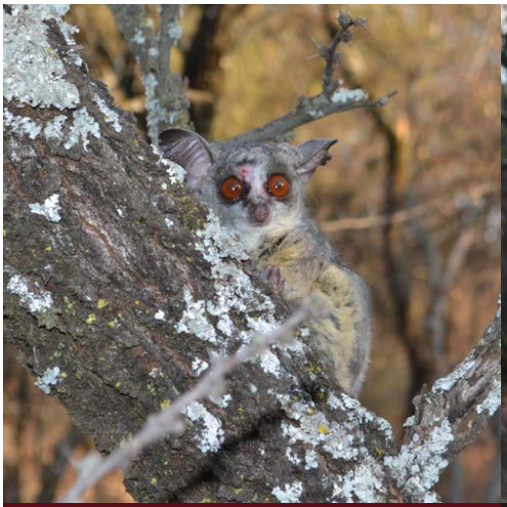
Research Programme: Oral Presentations

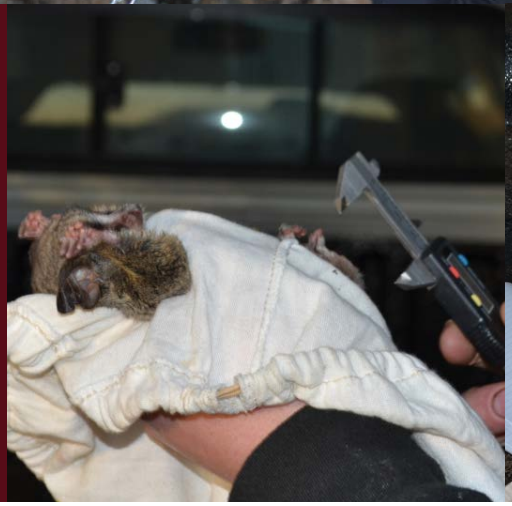
Reproductive activity and related hormone patterns in the African lesser bushbaby

Scheun J[1,2], Bennett NC[2], Nowack J[3,4], Ganswindt A[1,2,5]

1 Endocrine Research Laboratory, Department of Anatomy and Physiology, University of Pretoria, Onderstepoort, Pretoria, South Africa; email: Jscheun@zoology.up.ac.za.
2 Department of Zoology and Entomology, Faculty of Natural and Agricultural Sciences, University of Pretoria, Pretoria, South Africa.
3 Department of Animal Ecology and Conservation, Biocentre Grindel, University of Hamburg, Hamburg, Germany.
4 School of Environmental and Rural Science, Zoology, University of New England, Armidale, NSW, Australia.
5 National Zoological Gardens of South Africa, Pretoria, South Africa.

Steroid hormones are important in determining male and female reproductive activity and are often monitored in an attempt to explain the respective behavioural patterns observed. Although endocrine alterations linked to reproduction have been extensively studied in diurnal simian primates, little is known about the reproductive physiology, including endocrine correlates, for nocturnal, prosimian species. To rectify this shortage we attempted to characterise the pattern of reproductive- and stress-hormones during important reproductive events in the African lesser bushbaby (*Galago moholi*). We monitored seven captive mating pairs, as well as free-ranging individuals from the surrounding area, for eight months at Ithumela Primate Sanctuary, Buffelsdrift, South Africa. We collected faecal samples for non-invasive hormone analyses tri-weekly from the captive animals, and opportunistically from the free-ranging population. We also frequently conducted behavioural observations of both populations and took physical measurements including testis size. Our data show a significant increase in androgen concentration and testicular volume during periods of male reproductive activity, peaking during intense mating activity. Our results also indicate that a rather moderate elevation in androgen levels support male reproductive success. Five of the seven monitored captive females displayed regular ovarian endocrine activity with an average ovarian cycle length of 33.5 ± 1.3 days (mean ± SD); follicular phase (14.2 ± 1.04 days); luteal phase (19.12 ± 1.53 days). Five of the captive females became pregnant during the study, with an average gestation length of 128 ± 3.3 days. Elevated glucocorticoid concentrations were associated with male reproductive activity and mid- to late-gestation in pregnant females. The collected data from the monitored free-ranging population support these findings. This is the first study elucidating the reproductive behaviour and its endocrine correlates in the African lesser bushbaby.





Tuberculosis at the wildlife/livestock/human interface in the Mnisi community, Mpumalanga Province, South Africa

Musoke J[1], Said HM[2], Ehlers R[3], Sommerville J[3] and Michel AL[1]

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2 National Health Laboratory Service, Tuberculosis Laboratory, South Africa.
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The objectives of this study were to investigate the occurrence of tuberculosis (TB), including bovine TB (BTB) in humans, to determine the genetic diversity of *Mycobacterium tuberculosis* and the risk factors for TB transmission at the livestock/human interface. A total of 191 sputum samples were collected from patients with clinical symptoms of TB in the Mnisi community, a questionnaire was completed by same patients. Thirteen TB strains were isolated and genetically characterised using spoligotyping. A high diversity of *M. tuberculosis* lineages were observed. The *M. tuberculosis* lineages and sub-lineages were identified as T, Beijing, LAM 11_ZWE, X2 and S families. The T family sub-lineage ST 53, which is reported in literature as the dominant TB family in big urban provinces in South Africa (Gauteng and Free State), was dominant in the Mnisi community. In addition, based on the questionnaire survey few respondents (19.2 %) had history reports of TB in their households; this suggesting transmission was external of household members. Based on the high diversity of TB population structure, the dominant T family and questionnaire survey it can be concluded that migration has a great impact on the TB population structure within the community. Although BTB was not detected in the human samples analysed, meat consumption constituted a higher risk factor for contracting BTB compared to milk consumption patterns and human contact. In conclusion, improved TB monitoring which takes into account human migration as a risk factor would be beneficial in rural community settings. Based on the food consumption patterns observed, increased awareness of zoonotic diseases should be promoted to minimize risk of transmission at the interface.

The elimination of rabies from an endemic area by targeting strategic key points

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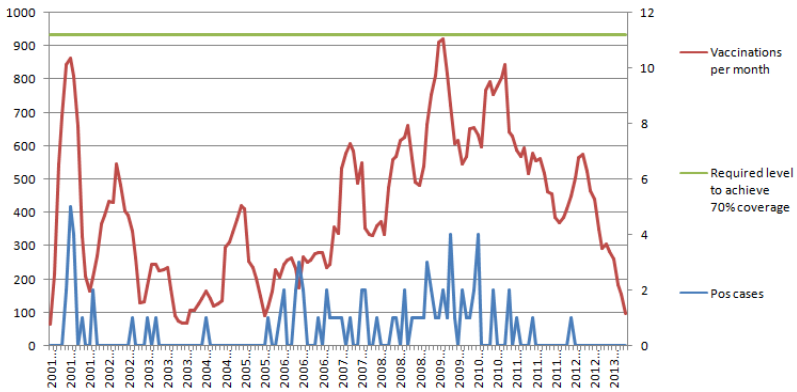
Canine rabies is controlled mainly through the vaccination of dogs. It is generally accepted that a herd immunity of 70% would result in its elimination but is seldom achieved due to poor resource allocation. The objective of this study was to determine if the strategic application of vaccinations could eliminate rabies from a longstanding endemic area. Beginning in 2009, rabies vaccinations were focused at strategic points along the borders between sub-populations of the study area. The rationale was to prevent the spread of infection between the sub-populations and allowing natural extinction of the virus in the smaller sub-populations. Phylogeographic analysis of rabies virus have shown before that regional variants arise and disappear with time. In 2012 the last positive case was diagnosed in the study area whilst a maximum of only 45% population immunity was achieved. To determine if the strategy was responsible for the success, a logistic regression model was developed using data from 2002 to 2014. The strategic application of vaccinations and the total number of vaccinations were included as determinant variables with elimination as the response variable. The model showed the strongest association in two areas of the meta-population that were amenable to strategic application due to their specific topography. These had p-values lower than 0.001 associated with the strategy and no significant association with the number of vaccinations. Another two areas of commercial farmland showed no significant association with any of the study variables. It is concluded that strategic placement of rabies vaccination campaigns can isolate sub-populations and assist to eliminate rabies within a meta-population. This requires fewer resources and is highly applicable in resource poor countries.



Determination of the pathophysiological consequences of capture and capture-induced hyperthermia in wildlife

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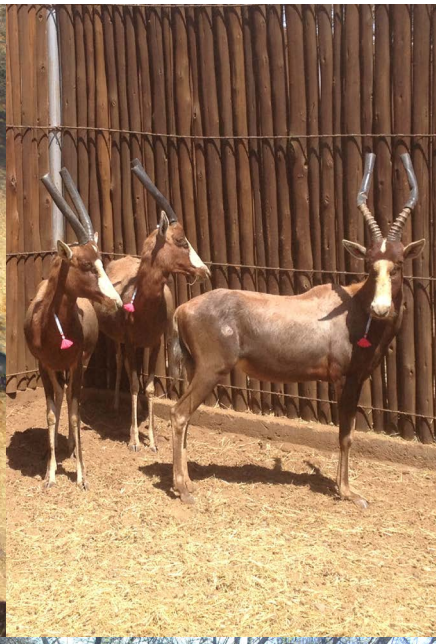
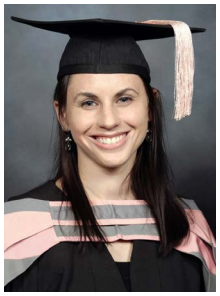
An unacceptable number of wild animals still die or experience morbidity as a result of capture-related complications. Capture-induced hyperthermia is believed to play a role in the morbidity and mortality of captured animals. The aims of this research were to gain a better understanding of the pathophysiological consequences of capture and capture-induced hyperthermia and to better understand the association between capture-induced hyperthermia and capture myopathy. We aimed to determine whether cooling could reduce the pathophysiological consequences of capture and protect against the development of capture myopathy. Forty blesbok were captured and housed at Groenkloof Nature Reserve and were divided into 3 groups – 1. hyperthermic coupled with cooling, 2. hyperthermic and not cooled, and 3. a control. The treatment groups (1&2) were chased for 15 minutes and then immobilized by dart. The control group (3) was not chased or stressed but animals were tranquilized with in-feed powder diazepam and then immobilized. One of the treated groups (2) was cooled with dousing 10L of water at 4°C for 10 minutes. The period of immobilization lasted for forty minutes. A variety of clinical and physiological parameters were measured. These included muscle and rectal temperature, serum biochemistry, blood gas analysis and muscle biopsies. Animals in all three groups were hypoxic and mildly acidaemic. Compared to the control group (3) the groups (1&2) that were chased had significantly elevated body temperature, cardiac troponin I, CK, AST and lactate levels. These variables indicated severe cardiac and mild skeletal muscle damage, most likely induced by severe anaerobic metabolism. Liver enzymes were also increased indicating mild intracellular liver damage. Despite cooling correcting body temperature it did not prevent or treat the pathophysiological alterations that occurred. Capture, after an intense chase, resulted in mild hepatic and skeletal muscle damage and severe cardiomyopathy which was not altered by cooling.





Pulmonary atelectasis: Computed tomography findings in healthy Beagles under general anaesthesia

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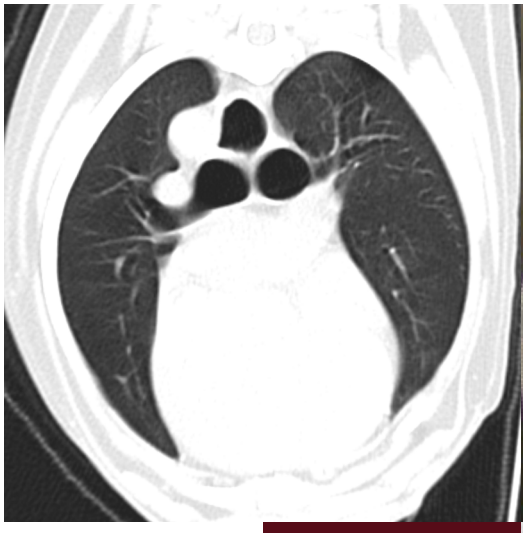
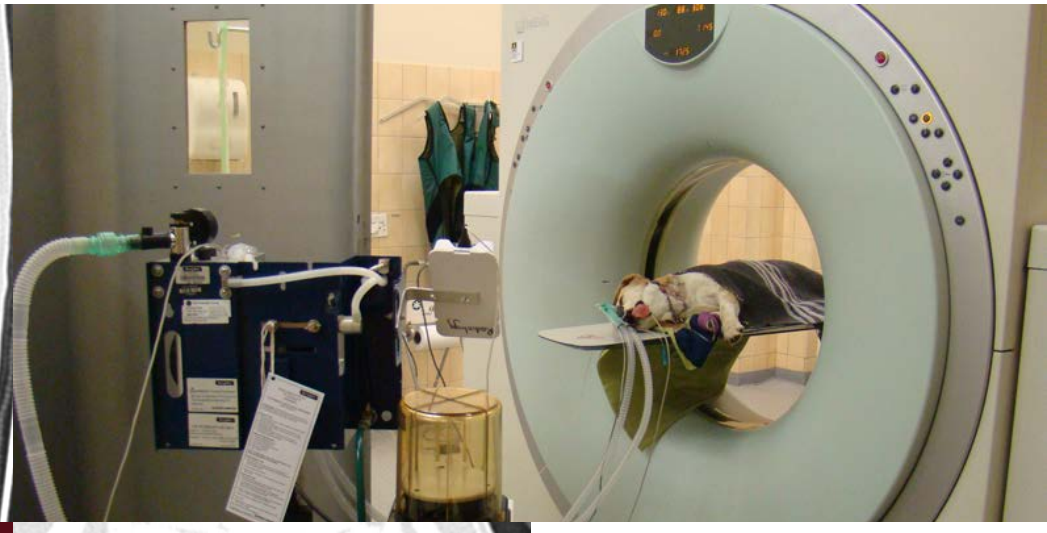
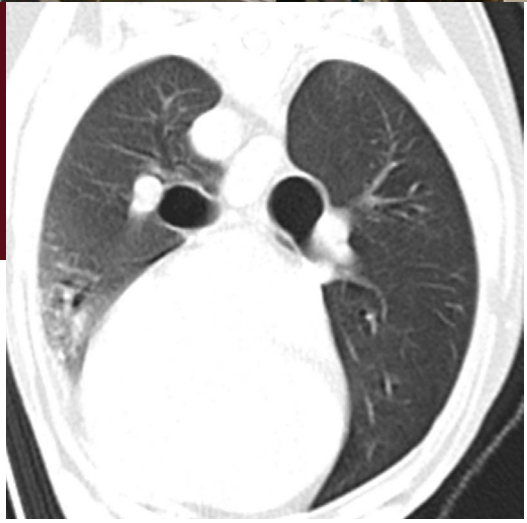
A large proportion of dogs undergoing computed tomography (CT) are anaesthetised and receive concurrent supplementary oxygen. Both factors are major contributors to the development of pulmonary atelectasis, which may mask or mimic lesions in the lung. The aim of the study was firstly to determine whether significant atelectasis would develop using a commonly employed anaesthetic protocol in a typical hospital setting, especially where patients may have been anaesthetised in lateral recumbency prior to CT. Secondly, to determine whether a change in body position to sternal recumbency would be sufficient to resolve any atelectasis. Six healthy adult Beagles were anaesthetized in sternal recumbency immediately prior to CT. Using a breath-hold technique, helical transverse thoracic images were acquired. A baseline scan was performed in sternal recumbency, followed by placement of dogs in either right (RLR) or left lateral recumbency (LLR) for 30 minutes, with scans performed at predetermined lung lobe locations and time intervals. Dogs were then repositioned in sternal recumbency for a further 20 minutes, with similar scans performed. The study was repeated two weeks later in the opposite lateral recumbency. Changes in Hounsfield units and cross-sectional area of the six lung lobes were measured. Lateral recumbency did not result in true atelectasis in a medium-sized breed dog of normal body condition. Infrequently, patchy increased attenuation, which failed to resolve completely during sternal recumbency, was visualised in the left lobes during LLR. The left *pars cranialis* was affected first, often within 3 minutes in LLR. The left cranial *pars caudalis* lobe was affected most frequently. Both were affected to the same extent. The degree of atelectasis formation in the clinical setting appears to be overestimated, and the study did not support the hypothesis that lateral recumbency would induce true pulmonary atelectasis. Anaesthesia in lateral recumbency should not preclude CT scanning.







Can plants used in ethnoveterinary medicine in southern Africa be a source of new compounds for the control parasites?

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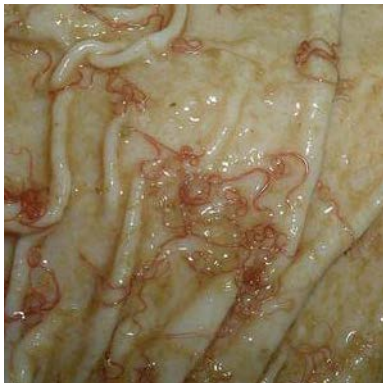
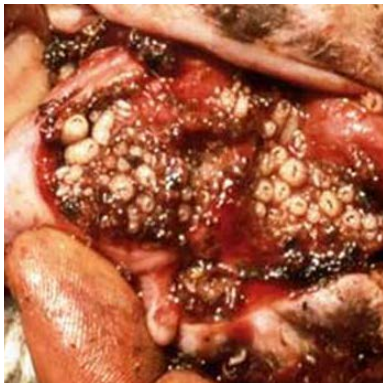
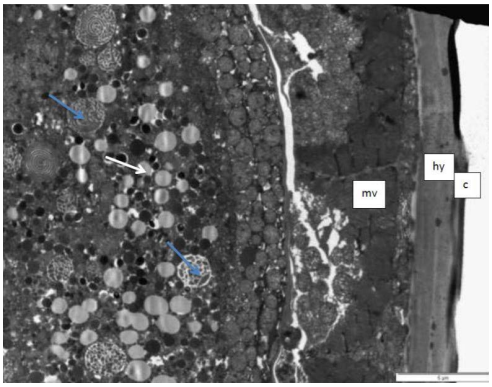
The unceasing development of resistance in parasites to antiparasitics creates a need for new categories of control products and a growing impetus to explore and utilise naturally occurring compounds. We sought to determine if some of the plants used in ethnoveterinary medicine in southern Africa to treat/control myiasis and helminthiasis could be sources of new lead compounds for the control of the parasitic blowflies and gastro-intestinal worms. This research was done in two different studies. In the first study, third instar larvae of *Lucilia cuprina* and *Chrysomya marginalis* were exposed to tenderised beef treated with various concentrations of acetone leaf extracts of selected plant species. Some of the plant species induced developmental anomalies in the blowfly including paralysis, prolongation of the prepuparium stage, reduced pupation rates, pupal malformation and reduced adult emergence. Isolation of the active compound(s) from the most active plant species was attempted using bio-guided fractionation and column chromatography. The pyranocoumarin, seselin, was identified as one of the bioactive compounds. In the second study 13 plant species were evaluated for activity against *heamoncus contortus* in an egg hatch assay and larval development test following the WAAVP guidelines. The most active 3 plant species had EC_{50} values of 0.62mg/ml, 0.72mg/ml and 1.08mg/ml in the egg hatch assay and 0.64mg/ml, 1.68 mg/ml and 1.27mg/ml in the larval development assay. Bio-guided fractionation of one of the plant species led to the isolation of anthelmintic phloroglucinol derivative with EC_{50} values of 0.52mg/ml and 0.08mg/ml in the egg hatch assay and larval development assay respectively. The mechanism of action of this compound seems to be unique. We then undertook a study to determine the effect of this compound on the efficacy of ivermectin and albendazole. The results from these studies indicate the potential of some plants used in EVM to produce antiparasitic products.



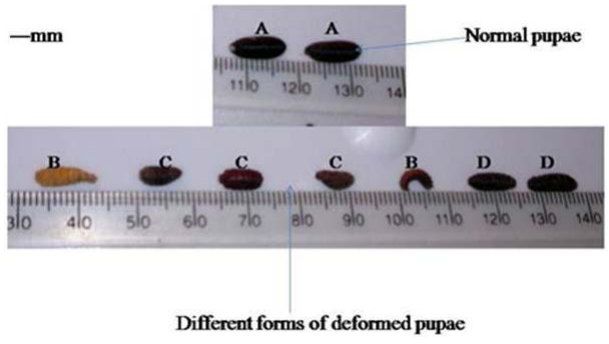
Abomasum of sheep infected with *Haemonchus contortus.*



Sheep vulva infested with blowfly larvae.



TEM micrograph of *Haemonchus contortus* after 3 h incubation with 1200µg/ml acetone leaf extract of *Leucosidea sericea* showing cuticular damages and vacuolization of the parenchyma (White arrow) and a loss or complete lack of cristae within the mitochondria (Blue arrow) and marked intracellular disorganisation. Microvilli (mv) showing loss of architecture.



Left: Different forms of purpae emerging from Lucilia cuprina larvae exposed to an acetone leaf extract of Clausena anisata at 150mg/ml.

A comparison of 4% modified fluid gelatin and 6% hydroxyethyl starch on haemodilution, colloid osmotic pressure, haemostasis and renal parameters in healthy ponies

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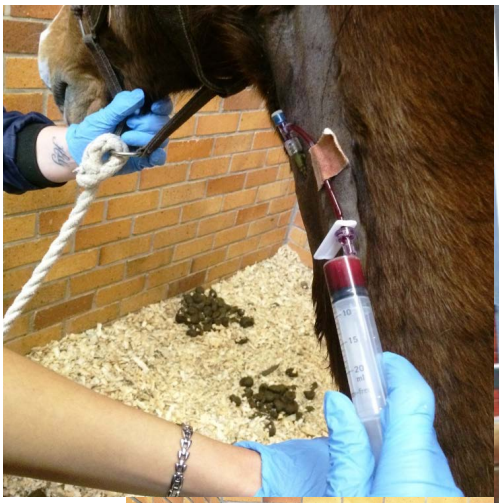
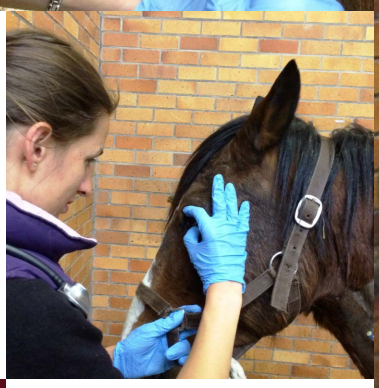
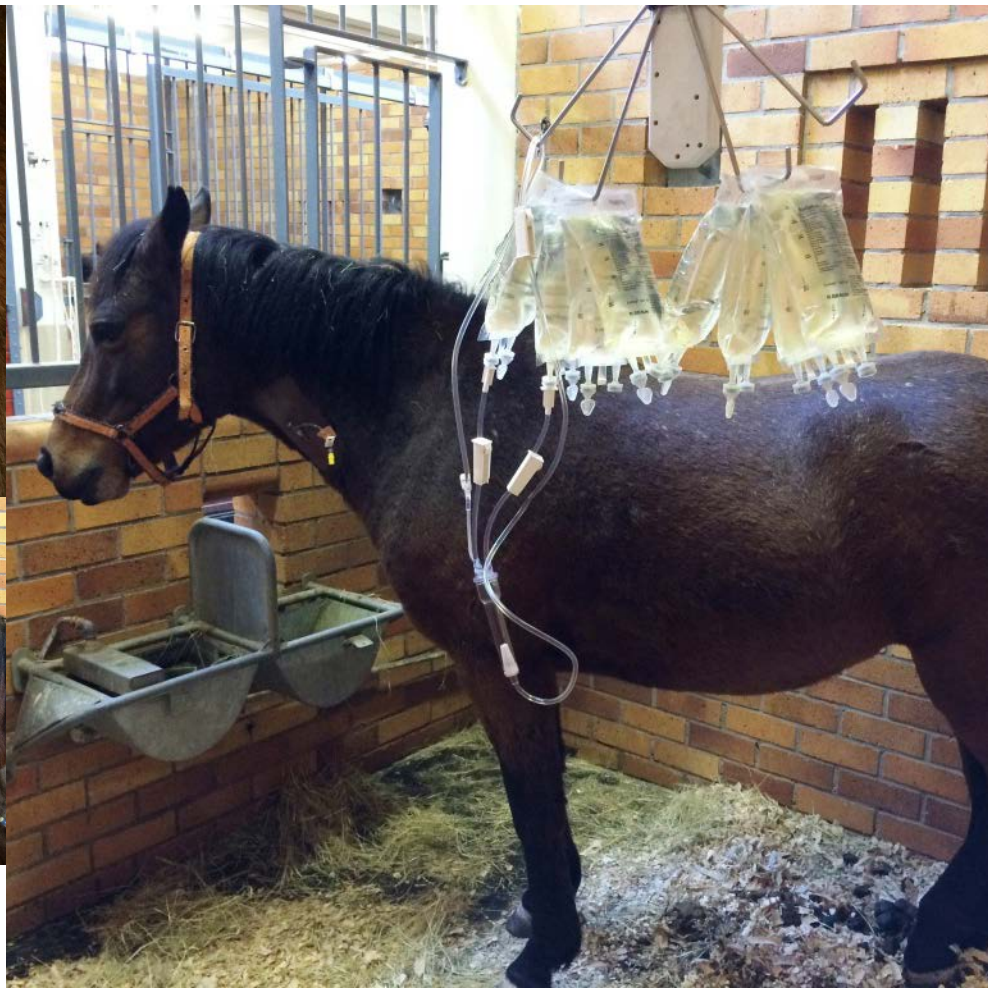
Adverse effects on renal health and haemostasis have been documented in human patients administered hydroxyethyl starches. Gelatins could provide useful substitutes for hydroxyethyl starches. The possibility of adverse effects subsequent to administration of these drugs should be investigated in equines. The study objective was to compare the effects of a 4% modified fluid gelatin (MFG) with a 130/0.4 6% tetrastarch (TES) on haemodilution, colloid osmotic pressure (COP), haemostasis and renal parameters in healthy ponies. A randomised cross-over study design was used. Three treatments (A=10ml/kg TES, B=10ml/kg MFG and C=20ml/kg MFG) were administered to 6 healthy ponies with a 1-week washout period. Haematocrit, total serum protein, COP, platelet count, fibrinogen, prothrombin time, activated partial thromboplastin time and thromboelastography were measured at baseline and at multiple time points up to 24 hours post-infusion. Serum creatinine, urine specific gravity, urine protein:creatinine ratio, urine gamma glutyltransferase:creatinine ratio and urine sediment examination were performed before and 24 hours after each treatment and one week after the final treatment. All treatments caused significant haemodilution and increases in COP, with treatment C having a significantly (p=0.001) greater effect on haematocrit than other treatments. The platelet count decreased with all treatments and was significantly (p=0.038) lower for treatment C compared to treatment B. No significant differences were observed in any thromboelastography parameters within or between treatments. No significant differences in platelet count, prothrombin time, activated partial thromboplastin time or fibrinogen were observed between treatments. Serum creatinine, urine protein:creatinine ratio and urine gamma glutyltransferase:creatinine ratio did not change significantly pre- and post-study. Urine specific gravity and urine sediment examination remained within normal limits. In conclusion, MFG could be considered as an alternative to TES for volume expansion and oncotic support**.** Neither MFG nor TES were associated with clinically significant adverse effects on haemostasis or renal parameters.







Using a passive mouse protection model as substitute for direct lethal anthrax challenge in target animals

Ndumnego OC[1], Koehler S[2], Buyuk F[3], Celebi O[3], Otlu S[3], Doganay M[4], Sahin M[3], Crafford J[1], Beyer W[2] and van Heerden H[1]

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2 Department of Environmental and Animal Hygiene, Institute for Animal Sciences, University of Hohenheim, Stuttgart, Germany
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The development and testing of new veterinary vaccines in target animals is increasingly difficult due to ethical and regulatory constraints. These problems are accentuated when testing vaccines against the highly lethal and fulminant anthrax due to high level bio-containment requirements. Little information exists on alternative methods of testing new vaccine candidates that correlates well with protection in the target animal. In this study we evaluated and compared an *in vivo* mouse model to live target animal challenge to assess the protectivity of non-living vaccine antigens in goats. The vaccine antigens comprised of recombinant protective antigen (rPA), spore-specific bacillus collagen-like antigen (rBclA) and formaldehyde inactivated spores (FIS). Vaccine candidates were administered in different combinations to groups of 5 (for *in vivo* mouse challenge) or 10 (for direct lethal challenge) age-matched goats. Immunogenicity in the goats was assessed by measuring specific antibody responses to the homologous antigens by ELISA and toxin neutralisation assay (TNA). The protectivity of these vaccines were evaluated in female age-matched A/J mice after passive transfer of immune serum followed by challenge with a lethal dose of Sterne vaccine spores or by challenge of vaccinated goats with fully lethal anthrax spores. Goats receiving a combination of rPA, rBclA and FIS yielded the highest antibody and TNA titres and protected 73 % of passively immunized mice and 80 % of directly challenged goats 14 days post-challenge. Sera from goats vaccinated with rPA and rBclA alone protected 68 % of challenged mice, while 50 % of goats receiving same vaccine complement survived lethal challenge. In conclusion, the passive mouse protection assay proved to be a reliable correlate for protection and can help to reduce animal numbers in future challenge experiments.

The scale pattern of the front limb and interscapular region of Temminck's pangolin (*Smutsia temminckii*)

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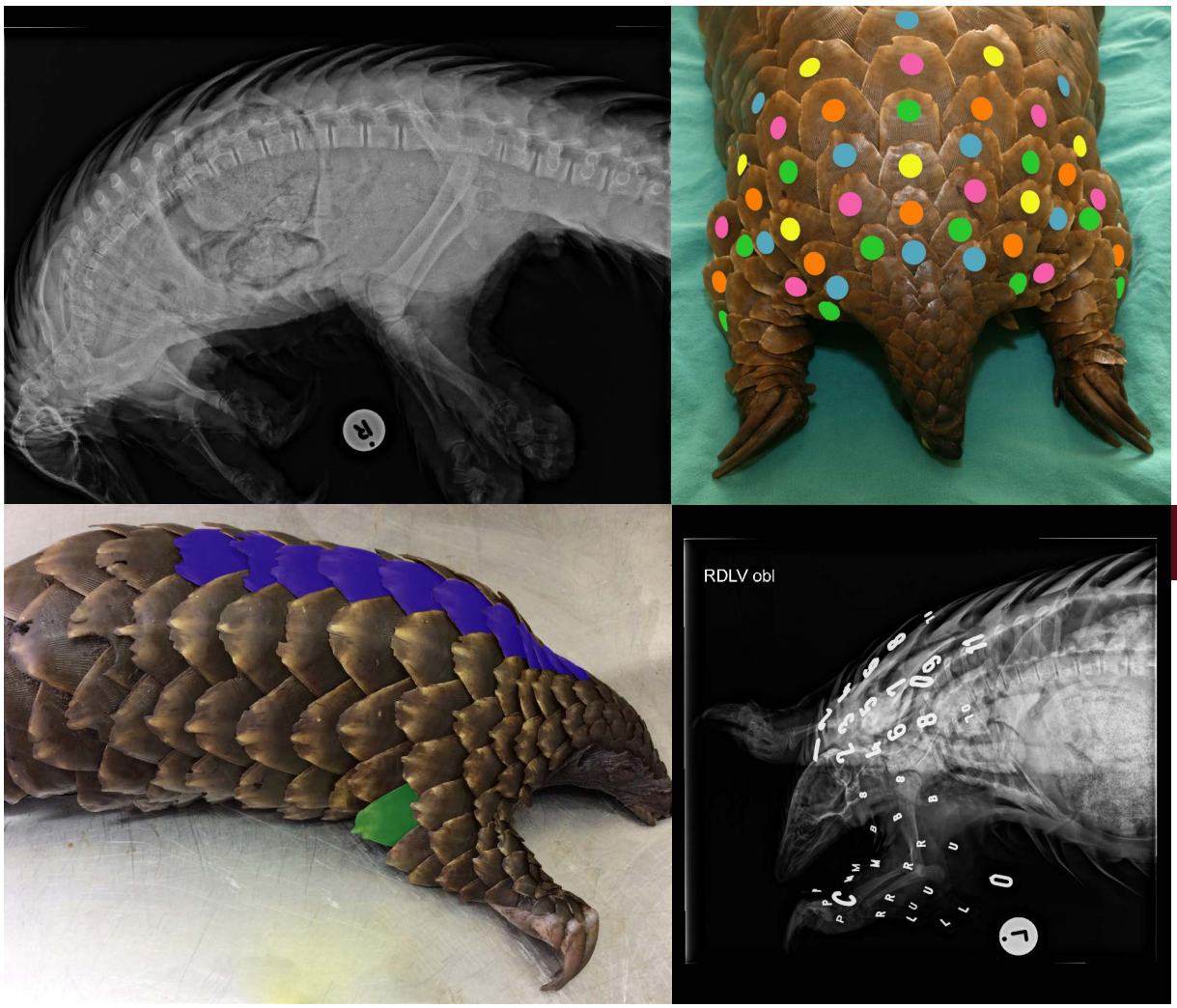
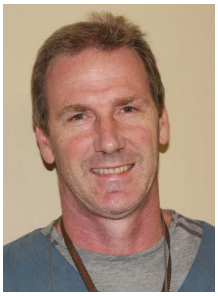
Temminck's pangolin is a scaled mammal which when threatened will roll up into a ball. This posture makes identification of underlying anatomical landmarks almost impossible. Based on the observation that various scale patterns occur in the eight extant pangolin species, this study aims to determine whether a consistent scale pattern can be determined which may be of clinical relevance in Temminck's pangolin, which is a threatened species. The scale pattern on the thoracic limb and interscapular region of four skeletally immature Temminck's pangolins, which were found dead in the field, was studied and related to underlying anatomical features. The sample group consisted of two males (7.0 kg and 8.3 kg) and two females (3.2 kg and 7.3 kg). The scales were described and photographed. Radiographic markers were placed on the scales of the region studied and the pangolins were radiographed. The basic arrangement of the scales was similar between the four specimens. On the interscapular region, shoulder, brachium and antebrachium, the scales were present in transverse rows of which alternating scales contributed to the formation of longitudinal columns running in the sagittal plane. A row of smaller, caudo-ventrally facing scales was present on the dorsum of the manus. The scales increased in size from cranial to caudal and decreased in size from the brachium distally. A conspicuously large scale overlying the olecranon was a landmark in all specimens. The scales with radiographic markers could easily be related to underlying anatomical structures. Based on this preliminary investigation, it would appear that the regular scale pattern displayed by Temminck's pangolin, in particular the identification of individual landmark scales, may be a useful guide for clinical procedures in this species.



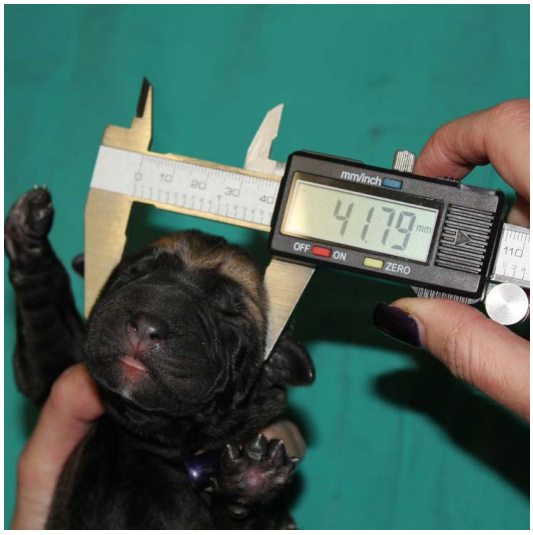


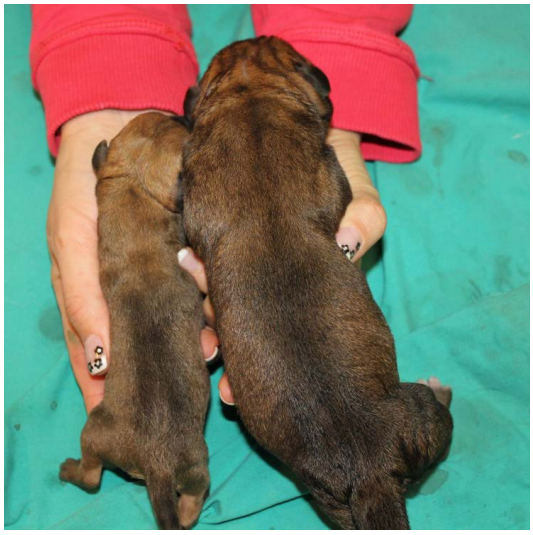
Do foetal biometric measurements in late gestation have potential in predicting readiness for caesarean section in dogs?

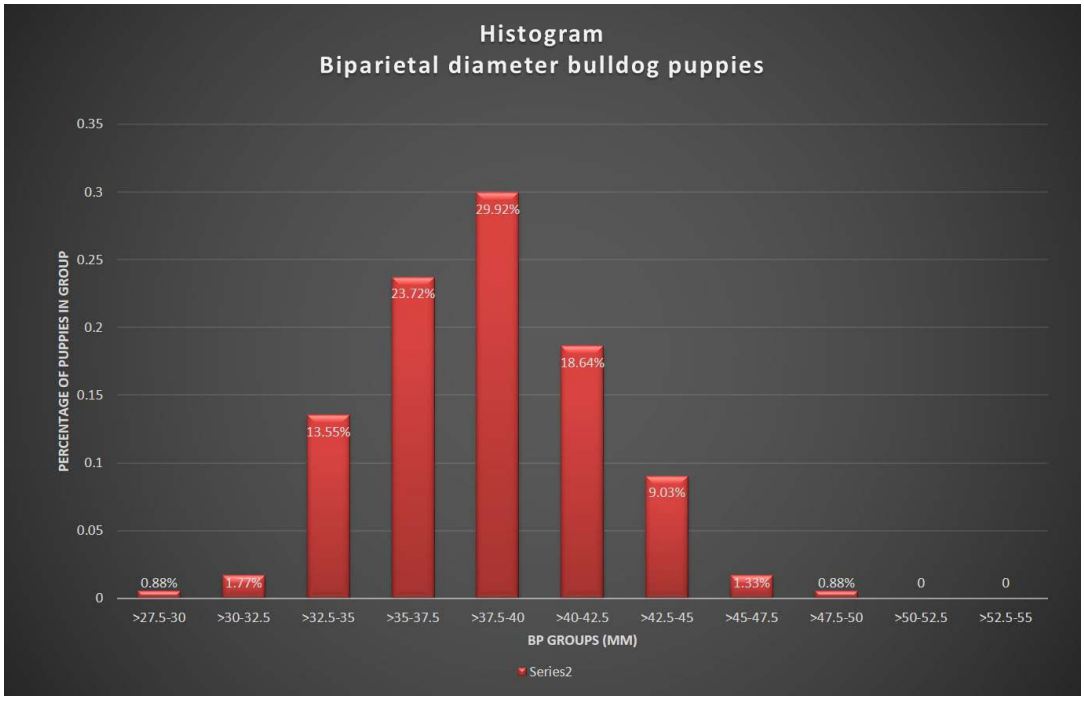
KGM De Cramer[1], *JO Nöthling*[2]

1 Rant en Dal Animal Hospital, Mogale City, Gauteng, South Africa; tel +27 0116603110; email: kdcramer@mweb.co.za.
2 Department of Production Animals, Faculty of Veterinary Science, University of Pretoria, Onderstepoort, Pretoria, South Africa.

Correct assessment of readiness for caesarean section (CS) is essential for timing elective CS during late pregnancy in the bitch. In humans, biparietal diameter (BPD) is sufficiently accurate and used in a clinical setting daily. The objectives of this study were to evaluate if BPD in late gestation in the dog could potentially be used to accurately predict readiness for caesarean section by having reached a minimum value. The BPD of 36 English bulldog litters (227 puppies) and 79 Boerboel litters (673 puppies). were measured immediately after delivery by caesarean section at full term using an electronic digital calliper and scale. With a CS all pups in a litter are delivered simultaneously and readiness for CS must be determinedfor a litter as a whole; therefore litters and not puppies were the experimental units. The range in the minimum, median and maximum BPD were 21.09–47.77, 32.93–49.97 and 34.19–58.24 mm, respectively, in bull dog litters and 18.35–48.74, 35.52–49.70 and 39.77–54.33 mm for Boerboel litters. Among the 36 bull dog litters, the smallest BPD of each of 11 litters were larger than the median of each of 11 others and the smallest BPD of each of six litters were larger than the maximum of each of six others. Among the 79 Boerboel litters the smallest BPD of each of 22 litters was larger than the median BPD of another 22 and the smallest BPD of nine litters were larger than the maximum BPD of nine others. This large variation suggests that BPD is too variable within and among litters to be useful as a means of determining readiness for CS.







Research Programme: Poster Presentations

Denovo assembly and characterization of the transcription from the abdominal fat body and other adipose tissues of the Nile crocodile (*Crocodylus niloticus*) in South Africa

Azeez OI[1,2], Myburgh J[3], Meintjes R,[1] Bosman A[4], Oosthuizen M[4] and Chamunorwa JP[1]

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The Nile crocodile population in the Loskop dam and Oliphant river in Kruger National Park, Mpumalanga province of South Africa has greatly been depleted; partly due to an outbreak of pansteatitis five to six years ago. This molecular investigation of the abdominal fat body and other adipose tissue is the first step in an attempt to unravel their role in the pathophysiology of pansteatitis. The whole transcriptome of the Nile crocodile was sequenced and assembled using whole transcriptome shotgun sequencing data by Illumina RNAseq from RNA obtained from fat body and other adipose tissues. RNA, from abdominal fat body and other adipose tissue from normal farmed Nile crocodiles and samples collected from Nile crocodiles that had died of pansteatitis, was extracted and purified using Qiagen RNA mini prep (Qiagen, USA). The RNA was prepared using the Ribozero approach for removal of ribosomal RNA and the cDNA library prepared for sequencing using Illumina HiSeq Genome Analyzer and assembled by Trinity (http://trinityrnaseq.github.io/) as it assembles the various contigs into clusters and constructs complete de Bruijn graphs for each cluster. 50 million reads were obtained per sample, from which low quality transcripts and redundancy were removed. A total of 39,210 transcripts with N50 of 1936 with median and average transcript lengths of 984bp and 643bp respectively were obtained from the transcriptome assembly. With gene ontology using GOseq, Blast2Go and Trinotate, we describe for the first time, the various genes in Nile crocodile that are expressed for inflammation and immune system mediation, oxidative stress and antioxidant activity, membrane transport, fatty acid metabolism and other regulators of biological, cellular and molecular processes.

Insights into the giraffe social system: Do giraffes have preferred partners?

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To date little is known about group composition and reproductive behaviour in giraffe and the underlying endocrine milieu possibly triggering these behaviours. The overall aim of this study is therefore to describe the endocrine correlates of male reproductive behaviour and the impact of ecological and social factors in free-roaming giraffe. By using faeces as hormone matrix, male-sex (androgens) as well as stress-related (glucocorticoids) hormone levels can be determined non-invasively without disturbing the animal, and therefore sampling is feedback-free due to the absence of capture and handling. By using genetic relatedness data, this study also aims to elucidate male group composition and potential interacting preferences on individual level. For sample and data collection, a giraffe population is currently monitored six days a week from dawn to dusk for a period of 12 months (Nov2014 – Oct2015) at Pongola Game Reserve, South Africa. Giraffes were individually identified by their unique pelage pattern and bulls were assigned to age classes based on body size, musculature of the neck, and shape of the skull and ossicones. Based on over 400 sightings, 90 individuals have been identified so far (12 adult males, 42 adult females, and 45 juveniles/subadult animals), and a total of 162 faecal samples for genetic and 360 samples for faecal hormone analysis collected. The medium group size of the study population seems to be 7.7 individuals (range: 1 – 27 animals) and the modal herd size is 3 giraffes. In over 80% of the sightings, mixed sex groups were encountered and the determined social differentiation index (1.10) indicates a well differentiated society, with presumably females driving the process. The observational data further suggest, that adult bulls are well connected to each other despite an expected overall more solitary lifestyle, whereas females show a tendency to associate with preferred partners.

Renal parenchymal volume determined by computed tomography in the clinically normal common marmoset (*Callithrix jacchus*)

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Imaging of exotic animals is more commonly performed using computed tomography. The aim of this study was to determine the estimated individual renal parenchymal volume (RPV) as well as the calculated RPV on post-contrast computed tomography (CT) in clinically healthy common marmosets. Post-contrast CT images of seven anesthetised clinically healthy mature common marmosets ranging from 12 to 48 months and 235 to 365 g bodyweight were acquired. On the transverse post-contrast images the contours of the individual kidneys were manually traced. Individual RPVs were estimated using the voxel count method. Additionally the prolate ellipsoid formula was used for a simplified volume calculation using three different height measurements (H1, H2 & H3). Using the voxel count method, the mean estimated volume of the left kidney was 0.85 cm3 +/- 0.13 cm3 with a range of 0.7 - 1.02 cm3; The mean estimated volume of the right kidney was 0.94 cm3 +/- 0.12 cm3 with a range of 0.76 - 1.11 cm. Using the prolate ellipsoid formula, the mean calculated volume of the left kidney using H3 was 0.85 cm3 +/- 0.13 cm3 with a range of 0.68-1.01 cm3; the mean calculated volume of the right kidney was 0.93 cm3 +/- 0.13 cm3 with a range of 0.77-1.09 cm3. It took less than 5 min to calculate both individual RPVs. The estimated RPV using CT could easily be determined in a timely manner in the clinically normal common marmoset, and a reference range could be established. Using the prolate ellipsoid formula, the volume could be calculated even faster and the values compared very well. Based on experiences in other species, it should be considered as an important prognostic marker and index for clinical decisions in the common marmoset with renal disease.

Aspects of the Morphological, Radiographic and Ultrasonographic Anatomy of the Ring-tailed Lemur (*Lemur catta*)

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The ring-tailed lemur is a species which is commonly kept in zoological gardens. It is classified as an endangered species by the International Union for Conservation of Nature and Natural Resources. The aim of this study was to describe the normal radiographic thoracic anatomy, radiographic and ultrasonographic abdominal anatomy as well as the normal morphology of the pelvis, thoracic and hind limb in captive ring-tailed lemurs as a reference for clinical use and identification of skeletal material and skeletal remains. Radiography and ultrasonography were performed in adult captive ring-tailed lemurs during annual health examinations. Bone specimens of adult ring-tailed lemurs were used for the osteological study. The morphology of the thoracic and hind limb of the ring-tailed lemur supported the presence of strong flexor and supinator muscles and flexibility of the limb joints, which are important in arboreal quadrupedal locomotion. However, the scapula is modified for both arboreal and terrestrial quadrupedal locomotion. Additionally, the pelvis and hind limb showed locomotor adaptation for jumping. Normal radiographic and ultrasonographic reference ranges for thoracic structures and abdominal organs were established and ratios were calculated. The mean vertebral heart score on the right lateral and dorsoventral views was 8.92 ± 0.42 and 9.42 ± 0.52, respectively. Pericardial fat was seen in heavy animals. Hypaxial muscles were conspicuous in the majority of animals. The kidney cortex was isoechoic to hyperechoic to the spleen and hyperechoic to the liver parenchyma. Knowledge of the normal morphology, radiographic and ultrasonographic anatomy of the ring-tailed lemur may prove useful in identifying skeletal remains and in the diagnosis of diseases.

Comparing haematological and biochemical parameters of healthy and critically injured rhinoceroses to determine prognostic indicators for survivability

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The rhinoceros poaching issue in South Africa is arguably the most important environmental crime crisis the country has ever faced. During 2014 more than 1020 rhinoceros were poached in South Africa, and often the plight of individual animals surviving such attacks are forgotten. Having the ability to predict outcome in clinical cases, taking into account clinical evaluation and results from various diagnostic and laboratory tests allow for the best possible management of resources combined with the best possible outcomes of cases by ensuring accurate treatment. The researcher collected data from a total of 60 white rhinoceros (*Ceratotherium simum simum*) divided into two groups, 38 in group I and 22 in group II. Group I was healthy control animals and group II poached or otherwise injured rhinoceroses. Samples consisted of blood samples, collected in serum, EDTA, heparin, fluoride oxide and citrate tubes from the auricular veins. Twenty one biochemical parameters were measured as well as complete blood counts were performed. Normal reference intervals were created from group I. Clinical pathological parameters showing prognostic potential from group II were creatine kinase (CK) and aspartate transaminase (AST). The reference ranges for these two parameters were determined to be CK 22-450 U/L and AST 13-101 U/L. Of the 22 injured individuals in group II, 16 had CK levels above reference range, from 2 - 100 fold the upper limit. Ten individuals had AST levels above normal ranges, though elevations were not as drastic as those of CK. The researcher correlated these finding with case outcomes, details of clinical cases such as classification of injuries and time between injury and veterinary attendance. Cases with AST above 500 U/L and CK above 10000 U/L had a poor prognosis.

Biomechanical comparison between pins – polymethylmethacrylate to the "String of Pearls" interlocking plate system to stabilise canine lumbosacral fracture-luxation

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Biomechanical comparison of two internal spinal fixation techniques, applied to a surgically simulated complete spinal injury at L7-S1 was conducted. The fixation techniques used were (1) pins - polymethylmethacrylate (pin-PMMA) and (2) the "String of Pearls" interlocking plate system (SOP). The study objective was to compare the stability provided by the two fixation techniques to the fracture-luxation. Cadaver specimens of 18 skeletally mature large-breed dogs (29.84 ±2.49 kg, mean ±1SD) with no history of spinal trauma and no signs of degenerative lumbosacral pathology were used. The lumbosacral spine specimens (L5-S1) were randomly divided into two equal groups and fixated using one of the two techniques. The specimens were subjected to a constant bending moment applied to the caudal and cranial end of the specimen via the Free Bending Canine Spinal Loading Simulator (FBC-SLS). The FBC-SLS loads the specimen in flexion-extension with a pure bending moment in the sagittal plane without any constraint in the craniocaudal axis; allowing translation along this axis and/or rotation about this axis. The measured bending moment and angular displacement of the joints were used to obtain the bending moment-joint angle characteristic of the joints. Biomechanical parameters (i.e. range of motion (ROM), neutral zone (NZ)) were extracted for the relevant joints and used to compare the stability of the two fixation techniques. The NZ for the injured joint was 0.26 ±0.17° and 0.17 ±0.16° for the pin-PMMA and SOP fixated groups, respectively. The range of motion for the injured joint was 2.5 ±1.2° and 1.4 ±0.51° for the pin-PMMA and SOP fixated groups, respectively. There is no significant difference between the means of the neutral zone (p=0.3565) and the range of motion (p=0.0631) of the injured joint fixated with the two fixation techniques. It is concluded that the stability provided by the two fixation techniques is similar.

Reproducibility, repeatability and reliability of heart rate variability in healthy, adult Nooitgedacht pony mares

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Heart rate variability (HRV) is a non-invasive method to quantify stress by measuring sympathetic and parasympathetic activity of the autonomic nervous system. The objectives of this study were to determine the reproducibility of correction factors (CF) used in HRV analysis and repeatability, reproducibility and reliability of HRV indicators in unrestricted (pasture) and restricted movement (crush) environments. Over the course of 5 days, HRV of 6 mares in a pasture and crush were recorded and tachograms of 5 min duration were compared. Correction filters were set at Low, Medium, Strong and Very Strong which identified RR-intervals differing 0.45, 0.25, 0.15 and 0.05 seconds, respectively from the local mean RR-interval, as artefacts. There were no significant differences in the comparisons between None, Low and Medium CF with regards to pasture and crush data, except None vs. Medium low-frequency normalised units. Medium vs. Strong CF for the crush data did not differ significantly, with the exception of percentage of beats that changed more than 50 ms from the previous beat (PNN50). Strong CF was therefore used to determine reproducibility, repeatability and reliability. HRV indicators showed good reproducibility and repeatability (pasture P=0.162-0.898; crush P=0.29-0.868), except for MeanHR and MeanRR. However, the reliability was moderate to poor for pasture (CV=10-68.10; ICC=0.59-0.79) and for crush data (CV=8.78-62.29; ICC=0.22-0.95). Crush data were less reliable than pasture data. Time-domain indices were more reliable than frequency-domain indices, however normalised low- and high-frequency components improved reliability. Comparison of HRV measurements between studies may be enhanced by using standardised methods. HRV has good reproducibility in pony mares, but moderate to poor reliability, thus results should be interpreted with care. Free-movement environment based HRV recordings ensure better reliability of results, but may require the use of a strong CF. Reproducibility of the CF should be evaluated if a stronger CF is used.

Efficacy of alphacypermethrin-treated high density polyethylene mesh applied to jet stalls housing horses against African horse sickness vectors

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Culicoides biting midges (Diptera: Ceratopogonidae) are of importance to health and trade in horses worldwide, primarily due to Orbivirus transmission. In particular, *Culicoides* (*Avaritia*) *imicola* Kieffer and *Culicoides* (*Avaritia*) *bolitinos* Meiswinkel have been implicated as vectors of African horse sickness (AHS) virus in South Africa. During export from and transit through AHS endemic countries or zones protection measures of a physical and chemical nature are required to protect horses from AHS vectors, as recommended by the World Organization for Animal Health. The efficacy of alphacypermethrin insecticide-treated high density polyethylene (HDPE) mesh, applied to a containerised air transport system for horses (jet stall), against *Culicoides* biting midges was determined by mechanical aspiration of midges from horses. Midges were aspirated around sunset from two horses housed in either a treated or untreated jet stall, as well as from an outside sentinel horse, in four blocks of a 3 x 2 randomised design under field conditions at Onderstepoort. Midges were also collected after sunset using Onderstepoort 220V downdraught black light traps operated inside the jet stalls. The alphacypermethrin-treated HDPE mesh applied to the jet stall significantly (P=0.008) reduced the number of *Culicoides* midges, predominantly *C. imicola*, mechanically aspirated from horses housed in the stall. The treated mesh reduced the *Culicoides* midge attack rate in the treated stall compared to the untreated stall and the sentinel horse by 6 and 14 times, respectively. The number of *Culicoides* midges and *C. imicola* collected in light traps from the untreated and treated stalls did not differ significantly (P=0.82). Alphacypermethrin-treated HDPE mesh could be used as a physical and chemical protection measure to reduce exposure of horses in jet stalls to *Culicoides* biting midges and the risk of midge-borne Orbivirus transmission.

Propofol-medetomidine-ketamine total intravenous anaesthesia in thiafentanil-medetomidine immobilised impala (*Aepyceros melampus*) of 120 minute duration

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A prospective clinical study was performed to characterise a propofol-medetomidine-ketamine total intravenous anaesthetic combination in impala (*Aepyceros melampus*), with the aim of developing a reliable anaesthetic protocol for both field and hospital conditions. Ten adult female impala were immobilised with 2 mg thiafentanil and 2.2 mg medetomidine via projectile darts. Propofol was given to effect (0.5 mg/kg boluses) to allow endotracheal intubation, following which oxygen was supplemented at 2 L/min. Anaesthesia was maintained with a constant rate infusion of medetomidine and ketamine at 5 µg/kg/h and 1 mg/kg/h, respectively and propofol to effect (initially 0.2 mg/kg/min) for a period of 120 minutes. The propofol infusion was titrated according to reaction to nociceptive stimuli every 15 minutes. Cardiopulmonary parameters were monitored continuously and arterial blood gas samples analysed intermittently. After 120 minutes maintenance the thiafentanil and medetomidine were antagonised using naltrexone (10:1 thiafentanil) and atipamezole (5:1 medetomidine), respectively, and recoveries scored. All impala were successfully immobilised, with a median time to recumbency of 9.6 (interquartile range, 7.2-14.4) minutes. The median dose of propofol required for intubation was 2.7 (1.9-3.3) mg/kg. The propofol-medetomidine-ketamine combination ensured recumbency for the 120 minute period. Propofol titration showed an erratic downward trend; a minimum infusion rate was not determined. Heart rate, respiratory rate and arterial blood pressure were well maintained. Arterial blood gas analysis indicated hypoxaemia, hypercapnia and acidosis. All impala regurgitated frequently during the maintenance period. Recovery was calm and rapid in all animals. Median time to standing from antagonist administration was 9.4 (8.2-10.6) minutes. In conclusion, a propofol-medetomidine-ketamine combination could provide adequate anaesthesia for invasive procedures in impala for up to 120 minute duration. The propofol infusion should begin at 0.2 mg/kg/min and be titrated to clinical effect. Oxygen supplementation and airway protection with a cuffed endotracheal tube are essential.

Molecular detection and genetic diversity of *Anaplasma marginale* and *A. marginale* subsp. *centrale* in cattle in South Africa

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Anaplasmosis, caused by *Anaplasma marginale,* is a globally prevalent, virulent haemoparasitic disease of ruminants. *A. marginale* subsp. *centrale* (*A. centrale*) causes a milder form of anaplasmosis in cattle and has been used as a vaccine in many parts of the world. However, this vaccine has major drawbacks and a safer and more effective vaccine is required. In order to develop assays that will detect a broad array of strains, we have evaluated three molecular assays for their ability to detect *A. marginale* and *A. centrale* in South Africa. Cattle samples (n = 528) were analysed for the presence of these parasites using a duplex qPCR assay targeting *A. marginale msp1β* and *A. centrale groEL* genes. Results of selected samples were compared to those of the reverse line blot (RLB) hybridization, and nested PCR assays. The qPCR assay detected both species in more samples than the RLB. The level of agreement between the qPCR and RLB assays was 'poor' (kappa score: 0.193 for *A. marginale* and 0.098 for *A. centrale*). Agreement between the qPCR and nested PCR assays for detection of *A. marginale* and *A. centrale* was 'moderate' (kappa score: 0.597) and 'good' (kappa score: 0.757), respectively. To determine if the qPCR primer and probe target regions are conserved, *msp1β* and *groEL* genes from selected samples were sequenced. Sequencing showed variation in the nested PCR internal forward primer region in *msp1β* sequences; *groEL* qPCR primer and probe target sequences were well conserved in *A. centrale*. Additionally, the *msp1β* qPCR primer and probe areas contained SNPs. It is recommended that a new assay for specific detection of *A. marginale* strains in South Africa should be developed. Despite the limitations of the qPCR assays, the results revealed that *A. marginale* and *A. centrale* are present in cattle in all provinces of South Africa except for the Northern Cape.

Comparative evaluation of RBT, CFT, iELISA and FPA for the serodiagnosis of bovine brucellosis in African buffalo (*Syncerus caffer*)

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African buffaloes are of ecological and socio-economic importance to South Africa and are a wildlife host of *Brucella abortus.* To ensure evidence based control and study of bovine brucellosis in African buffaloes, validation of serological tests for the detection of brucellosis in this species is essential. Four serological tests for bovine brucellosis, the Rose Bengal test (RBT), complement fixation test (CFT), IDEXX iELISA and Diachemix fluorescence polarisation assay (FPA) were evaluated in a case-control study with convenience based sampling. Infected and uninfected reference panels were selected based on composite reference standards. Diagnostic sensitivity (DSe) and specificity (DSp) were determined. Receiver-operating characteristics analyses for diagnostic tests were performed to optimise DSe and DSp. Repeatability was assessed by calculation of the unweighted Kappa or the Pearson's correlation coefficient. RBT: DSe was 98.9 % (95 % confidence interval (CI) 96.83 % - 101.0%) and DSp 98.1 % (95 % CI 95.57 % - 100.7 %). The unweighted Kappa co-efficient was 0.9699 (95 % CI 0.93561 - 1). CFT: DSe was 69.9 % (95 % CI 69.4 %-87.2 %) and DSp 100.0 % (95 % CI 100.0 % - 100.0 %) at the cut-off value of > 20 iU/ml. iELISA: DSe was 86.0 % (95 % CI 79.0 % - 93.1 %) and DSp 100.0 % (95 % CI 100.0 % - 100.0 %) at the cut-off value for S/P ratio of 80%. The Pearson's correlation coefficient was 0.97. FPA: DSe was 97.8 % (95 % CI 94.9 % - 100.8 %) and DSp was 100.0 % (95% CI 100.0 % - 100.0 %) at the cut-off value of 20 ΔmP. The Pearson's correlation coefficient was 0.17. The tests were found fit for purpose to detect or confirm brucellosis in African buffalo populations and individuals. Unsatisfactory repeatability of the FPA stresses the importance of technique. The values for DSe and DSp will be of use in the interpretation of serological results and determination of diagnostic strategies in different circumstances.

Comparative genomics and proteomic analysis of four non-tuberculous mycobacteria and MTB complex: occurrence of shared immunogenic proteins

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Interference of non-tuberculous mycobacteria (NTM) in tuberculin-based assays for diagnosis of bovine tuberculosis (BTB) has triggered investigation of 'specific' or defined antigens as markers for BTB. The Esx and PE/PPE family proteins are among the most immunodominant mycobacterial antigens and have thus been the focus of research to develop vaccines and immunological tests for diagnosis of bovine tuberculosis. In non-tuberculous mycobacteria (NTM), cross-reactive homologues of these proteins have mainly been identified in pathogenic species such as *M. kansasii* and *M. marinum.* In this study we elucidated the genomes of four non-pathogenic NTM species viz. *M. komanii* sp. nov., *M. malmesburii* sp. nov., *M. nonchromogenicum* and *M. fortuitum* ATCC 6841. We analysed the NTM genomes for the presence of genes homologous with those of *M. bovis* AF2122/97 and *M. tuberculosis* H37Rv. Our investigations focused on the presence of genes encoding for the Esx family proteins, PE/PPE proteins and other dominant immunogenic proteins such as MPB70 and MPB83. This analysis revealed the occurrence of orthologs of some of the Esx family genes including those encoding for the 6 kDA early secretory antigenic target ESAT-6 (*esxA*), the 10 kDA culture filtrate protein CFP 10 (*esxB*), TB9.8 (*esxG*), TB10.4 (*esxH*), TB10.3 and (*esxR*). Genes of the PE/PPE family identified in NTM include *pe35*, *ppe68* and *pe5*. The major secreted immunogenic protein MPB70 (*mpb70*) was identified for the first time in non-pathogenic NTM, the beta-carbonic anhydrase CanA (*CanA*), the chaperone protein DnaK (*dnaK*), the 16 kDa immunoprotective extracellular protein MPT63 (mpb63), immunogenic protein and Mpt64 (*mpb64*) were also identified. Identification of these gene orthologs in NTM suggests their potential to elicit cross-reactive immune responses against MTBC antigens. Therefore this study has laid a foundation into a targeted investigation of the ability of these non-pathogenic NTM to cause cross-reactive immune responses with *M. bovis* antigens.

Evaluating cell surface display as a potential brucellosis antigen delivery system

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Brucellosis is a global zoonotic disease, associated with significant morbidity that can lead to spontaneous abortion and infertility in livestock. *Brucella abortus* is the causal agent of bovine brucellosis. Current vaccines against bovine brucellosis are based on live attenuated strains of *Brucella spp*. The disadvantages associated with the use of these vaccines include the infectiousness to humans, interference with diagnosis as they elicit similar immune profiles to infected animals and induction of abortions in pregnant animals. The CSIR Biosciences have developed *Yarrowia lipotytica* as a potential cell surface display host. Using the abovementioed display system and the *Escherichia coli* outer membrane protein (OmpA) and auto-transporter (AIDA-I) display systems, *Brucella spp*. antigens derived by reverse vaccinology will be surface displayed for the development of a viable, recombinant whole cell brucellosis vaccine. A web-based vaccine design programme (Vaxign) was utilized to predict candidate vaccine targets based on adhesion, epitope binding to MHC class I, displaying no homology to humans, mice and pig proteins and subcellular localization to the outer membrane. Using these criteria, the outer membrane proteins, Omp16 and Omp19 were selected as targets. *In silico* peptide prediction (IEDB and Epitopia servers) was utilized to select regions in the Omp16 and Omp19 amino acid sequences that have antigenic (B cell and T cell epitopes) traits. Furthermore, Omp16 and Omp19 protein modelling was performed to characterize surface exposed loop regions. The characterized surface exposed and antigenic epitopes will be displayed on the surface of *E. coli* using OmpA as the anchor protein.

The prevalence of tuberculosis in domesticated African Elephants (*Loxodonta africana*) and their handlers in the Victoria Falls and Livingstone area: a pilot study

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The objectives of this study were to establish the presence or absence of *Mycobacterium tuberculosis/M.bovis* infection in the elephant population of Victoria Falls and Livingstone; to establish if elephant handlers are a primary risk for infection of the captive elephants; to determine the test agreement between the tuberculosis (TB) DPPTM assay (ChemBio Diagnostic Systems, Inc.), ElephantTB Stat Pak® (ChemBio Diagnostic Systems, Inc.), ELISA and elephant specific interferon-gamma assay (eiFN-g assay) and TB ELISA tests in the diagnosis of *M. tuberculosis* in captive African elephants; to conduct a questionnaire survey to establish the exposure risk between the domesticated elephants and the elephant handlers in the elephant properties of Victoria Falls and Livingstone. Fifty captive African elephants *(Loxodonta africana)* from six privately owned facilities in Victoria Falls (North Western Zimbabwe) and Livingstone (South Eastern Zambia) were sampled between September to November 2014. Samples from all elephants were tested using the eiFN-g assay and serological tests (ElephantTB Stat Pak®/TB DPPTM Assay/ELISA or TBELISA). During each sampling occasion a TB risk assessment questionnaire was used for every animal that was sampled. A diagnostic algorithm will be developed to classify infected elephants. In addition sixty four out of 78 elephant handlers from the properties under study voluntarily underwent TB testing at their nearest local health institution. Based on as yet arbitrary interpretation of the IFN gamma assay thirteen elephants were classified as test positive animals. Twenty six elephant handlers were screened by radiography at the Livingstone General Hospital and one handler was confirmed to be infected with TB. Thirty eight handlers were voluntarily screened for Tb using the sputum method at Victoria Falls Hospital. One handler was confirmed to be infected with TB.

Comparison of *Bacillus endophyticus* with *B. anthracis* isolated from anthrax outbreaks in South Africa

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Bacillus anthracis, the causal agent of anthrax, is a Gram-positive rod shaped, endospore forming, non-motile, non-haemolytic, penicillin and gamma-phage sensitive bacterium. The very closely morphologically related *B. endophyticus* is a Gram-positive, rod shaped, endospore forming, non-motile, non-haemolytic, penicillin sensitive but gamma-phage resistant bacterium. *Bacillus endophyticus* strains were isolated along with *B. anthracis* strains from animals that died of anthrax in 2009, in the Northern Cape Province, South Africa. *Bacillus endophyticus* strains were differentiated from *B. anthracis* using 16S rRNA gene sequences. This study characterized *B. endophyticus* strains using morphological and biochemical characteristics and whole genome sequencing. Whole genome sequencing was carried out using an Illumina platform with 100 bp insert size paired end. The polyglutamate (PGA) biosynthesis genes were compared between *B. anthracis* and *B. endophyticus* using genome sequences. PGA genes were characterized by screening on the shotgun genome sequences and the presence or absence of a capsule was determined. The presence of PGA encoded by *pgs* BCAD genes of *B. endophyticus* and *cap* BCADE genes of *B. anthracis* indicated that the subunits BCAD were found in the *B. endophyticus* strains and the available sequenced *B. endophyticus* 2102 strain. However, the presence of a capsule was not observed in *B. endophyticus* strains. Sequence nucleotide variations on the PGA subunits ABCD were observed in the *B. endophyticus* strains when aligned with *B. anthracis.* The PGA genes identified in the *B. endophyticus* strains suggest that they might have a biological role in increasing the resistance to adverse environments rather than a virulent capsule in *B. anthracis.* The study highlights the importance of distinguishing the *B. anthracis* from the *B. endophyticus* strains for diagnostic purposes.

Molecular characterization of Rift Valley fever virus isolates from Mozambique and phylogenetic comparison with selected other isolates.

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Rift Valley fever (RVF), a zoonotic viral disease causes outbreaks in sub-Saharan Africa, Egypt, Saudi Arabia and Yemen. Recent outbreaks in Eastern and Southern Africa include 2007/10 in Sudan, Kenya and Tanzania, 2007/8 in the Comoros and major outbreaks in 2008/9, 2010 and 2011 in South Africa (SA). The virus has a tripartite segmented RNA genome, comprising large (L), medium (M) and small segments. RVF viruses (RVFV) are grouped into 11 lineages with viruses from Southern and Eastern Africa grouping in Lineage C. The aim of this study was to confirm the presence of RVFV in samples from outbreaks in Mozambique in 2013/14. Sequence data from these isolates were then compared with selected isolates from neighbouring countries and other regions. Samples were collected from the Goba and Chibuto areas, Mozambique and analysed using RT-qPCR targeting the L-segment of RVFV. Phylogenetic analysis was conducted using sequence data from a 490 nt portion as well as the entire M-segment of these isolates, unpublished isolates from outbreaks in 2008 in SA, Namibia and Madagascar as well as from selected isolates available in GenBank. Isolates from Mozambique, along with the unpublished SA isolates, grouped together within Lineage C and were more closely related to isolates from Sudan than to isolates from neighbouring SA and Tanzania. The unpublished isolates from SA and Namibia grouped with viruses that caused outbreaks in 2006/7 affecting Kenya, Tanzania, Somalia and in 2008 affecting Madagascar, Mayotte and SA. These groupings were not influenced by the sequence length of the M-segment. Evidence of RVFV circulation in 2013/2014 in Mozambique was confirmed and phylogeny links isolates more closely to the 2007 and 2010 RVF outbreaks in Sudan than to the 2008 outbreaks in SA. This relationship might imply introduction of the virus into Mozambique from elsewhere in Africa and not SA.

Sero-prevalence of brucellosis in cattle in Swaziland

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This study aimed at establishing the first cross-sectional sero-prevalence study of bovine brucellosis in the cattle population in Swaziland. Twenty diptanks out of 778 functional diptanks were randomly selected for the cross-sectional brucellosis survey across all the four regions of Swaziland. A total of 1623 bovine sera out of an estimated cattle population of 622 715 was tested for the presence of *Brucella spp*. antibodies using the Rose Bengal test (RBT) and indirect enzyme linked immunosorbent assay (iELISA). The iELISA proved to be more sensitive than the RBT, overall. However, at some diptanks the RBT yielded more sero-reactors than the iELISA and vice versa. The serological prevalence of bovine brucellosis at diptank level ranged from 0.0 % to as high as 53.3 % and 50.9 %, as determined by the RBT and iELISA tests, respectively. However, to achieve maximum sensitivity in this survey a parallel interpretation of the test results achieved by the two tests was used. Therefore, combined sero-prevalence at diptank level ranged from 0 % up to 60.47 %. Regional sero-prevalence ranged from 0.68 % to 11.40 % and the Lubombo region had the highest sero-prevalence and Hhohho region the lowest. An overall sero-prevalence of 21.50 % was established. The western parts of the country exhibited a lower bovine brucellosis sero-prevalence, however, a systematic national bovine brucellosis is recommended.

Development and evaluation of real-time PCR for validation of RNA-seq data for *Theileria parva*

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Theileria parva has been classified into two types namely cattle and buffalo-derived *T. parva* isolates, both causing different disease fatal to susceptible cattle, namely East Coast fever and Corridor disease respectively. To understand the reason behind the difference in disease syndromes resulting from *T. parva* infections, transcriptomes of the two *T. parva* isolates were characterised using Next Generation Sequencing (NGS). Differentially expressed genes (DEGs) were identified from the transcriptome analysis. Consequently this study employed qPCR to validate expression profiles of selected DEGs. A total of 20 DEGs were selected including 10 genes (five from each isolate) exclusively detected in each isolates and 10 (five from each isolate) up-regulated genes. Using gene-specific primers on cDNA prepared from the RNA employed in transcriptome analysis, the selecteld DEGs were subjected to qPCR and expression profiles were determined using the comparative ΔΔCt method. For genes exclusively detected in the *T. parva* Muguga isolate, the qPCR results exclusively detected 4/5 genes while the remaining gene was detected in both isolates. Significant up-regulation of this particular gene was observed in *T. parva* Muguga. Similar to genes exclusively detected in *T. parva* 7014 by NGS, qPCR exclusively detected 4/5 genes in this isolate. Surprisingly the fifth gene only amplified in *T. parva* Muguga. Consistent with NGS data for up-regulated genes, 6/10 genes were confirmed to be up-regulated by qPCR, three from each isolate. Notable were 3/10 genes which were detected in single isolates while the remaining one showed to be stably expressed between the two isolates. The qPCR data illustrated that the expression estimates given by RNA-seq for rare transcripts does not always correlate with qPCR estimates. Overall, qPCR successfully confirmed differential expression for the majority (14/20, 70 %) of the DEGs selected for validation between *T. parva* Muguga and *T. parva* 7014.

Reassortment of bluetongue virus vaccine serotypes in cattle

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Bluetongue virus (BTV) is the aetiological agent of bluetongue, an insect transmitted disease of domestic and wild ruminants. Sheep are the natural host of the virus in South Africa and cattle normally seroconvert but do not in general show clinical signs. The role of bovines in the epidemiology of the disease in South Africa is not clear. The BTV genome consists of ten segments of double-stranded RNA. These segments have the ability to reassort in the host or vector when these are infected with more than one strain. When reassortment occurs between genetically and phenotypically divergent BTV strains, it may lead to the emergence of new virus strains containing new undesired biological properties. The aim of the study was to determine if reassortment can occur between different BTV vaccine strains as well as between these vaccine strains and a virulent field strain. Three 8 months old bovines were infected simultaneously with five vaccine serotypes of Bottle 2 of the BTV vaccine, while another three bovines were infected simultaneously with the vaccine strains as well as a virulent wild type BTV serotype 4. Heparin, serum and EDTA blood were collected during viraemia and clinical signs were monitored daily. Viruses were isolated from blood, using plaque purification and the virus genomic material characterized using PAGE gel electrophoresis and sequencing. Data obtained from the original BTV serotypes from Bottle 2 of the vaccine as well as the virulent BTV-4 strain were used as controls. Clear mobility shifts were visible in a number of samples using PAGE gel electrophoresis. Sequence data confirmed reassortment between different strains of the virus. The ability of vaccine strains to reassort with each other as well as with circulating field strains in cattle, an amplifying host of the virus, play a significant role in the epidemiology of the disease.

Antimycobacterial activity of the crude extract of *Psychotria zombamontana* and fractions against pathogenic and non-pathogenic *Mycobacterium* species

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Tuberculosis (TB) is an infectious and deadly disease that infects about one-third of the world's population, with approximately 1.4 million deaths and 8.4 million new cases recorded annually. Many plant species contain antimycobacterial compounds which may possibly serve as template molecules for new anti-TB drugs. The Rubiaceae family is the largest family of trees in southern Africa and preliminary evidence has shown some antimycobacterial activity in of several species. The acetone extract and 5 fractions from *Psychotria zombamontana* were screened for antimycobacterial activity against three non-pathogenic mycobacteria, namely *Mycobacterium aurum (NCTC 10437), M. fortuitum* (ATCC 6841) and *M. smegmatis* (ATCC 1441), as well as pathogenic *M. tuberculosis* (8104) using a serial microdilution assay. Cytotoxicity was determined using a tetrazolium-based colorimetric cellular assay (MTT) against C3A human liver cells and Vero monkey kidney cells. The selectivity index (SI) values of the extracts were calculated. Experiments to investigate synergistic activity of the extract and fractions with rifampicin were also conducted. The acetone extract of *P. zombamontana* had significant activity against the four mycobacteria. The hexane and chloroform fractions had excellent activity with MIC values ranging from 0.039 to 0.16 mg/ml. The crude extract and fractions had relatively low cytotoxicity against C3A liver cells with LC_{50} values ranging from 2.28-0.36 mg/ml. The chloroform fraction had the highest SI values of 0.625, 2.56 and 0.16 while the 35% water fraction had the lowest SI values of 0.024, 0.02 and 0.048 against *M. aurum*, *M. fortuitum* and *M. smegmatis* respectively. The combination of *P. zombamontana* with rifampicin and its fractions with rifampicin against the tested organism showed synergistic to additive effects with ∑FIC values ranging from 0.31-0.75 and 0.078-0.531 respectively. It can be concluded that the chloroform fraction contains one or more compounds with antimycobacterial activity, thereby justifying further research on isolating the active compounds.

Molecular identification of Enterobacteriaceae and *Salmonella* species in retailed eggs in South Africa

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Food safety is an important health issue and governments across the world are intensifying their efforts to improve the quantity, quality and also the safety of national food supplies. *Salmonella* pathogens are the most common cause of food poisoning worldwide with negative economic consequences; and poultry meat, eggs and their products are major sources of human salmonellosis. This study aimed to establish the baseline epidemiology and the most prevalent serotypes of salmonellae using molecular techniques for effective control and improved productivity. Egg samples were pre-enriched in buffered peptone water and incubated at 370C for 24 hours. One ml of the overnight broth sample was added to 9 ml of tetrathionate broth before plating them individually on XLD agar for 24 hours for bacterial growth. Bacteria were identified by Gram stain and confirmed by biochemical assays. Serotyping, MALDI-TOF Biotyper and PCR (GTG5) were used to reliably identify a wide range of microorganisms. Out of 468 egg samples and 17 brands that were analysed during this survey, some egg brands had as high as 50% *Salmonella* positive samples, making them highly unsafe for consumption. Ten percent (10%) of eggs tested positive for *Salmonella* in this study making them unsafe. Confirmation of presumptive Enterobacteriaceae and *Salmonella* species was done by MALDI-TOF assay and PCR and the following species were identified: *Enterobacter cloacae* 11%, *Proteus mirabilis* 7%, *Stenotrophomonas maltophilia* 7%, *Klebsiella pneumoniae* 4%, and *Salmonella* species 71%. Serotyping and PCR was used to identify the *Salmonella* species. Identified *Salmonella* species were *Salmonella* typhimurium (88%), *Salmonella dublin* (9%) and *Salmonella braenderup* (3%). The presence of these organisms is potentially dangerous to health; therefore consumers are advised to avoid consuming raw eggs and products containing raw egg products.

Antibacterial, anti-oxidant and cytotoxic properties of nine South African ethnoveterinary plants

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South Africa boasts a unique and diverse botanical heritage with over 30 000 plant species of which about 3 000 are used therapeutically. Also, this country is ethnically diverse with traditional healing being integral to each group, only recently have some findings emerged on the chemistry and biological activity of plants used in traditional healing. The plants used in this study have been used to treat parasitic infections in livestock and humans. We examined the toxicity and other potential uses of these plant species by determining the antibacterial and antioxidant activity of their leaf acetone extracts. Cytotoxicity was determined by evaluating the viability of cells in the presence of the plant extracts using the tetrazolium-based colorimetric assay against Vero African Green monkey kidney cells, antibacterial activity was determined by using a serial microdilution method against *Staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli* and *Enterococcus faecalis* while the antioxidant activity was determined based on scavenging capacity against specific biological Reactive Oxygen Species (ROS) using the DPPH method. *Antizoma angustifolia* and *Cassia (Senna) italica* had good bacterial inhibition properties with *A. angustifolia* having MIC value of 0.02 mg/ml against *S. aureus* and *C. (S.) italica* having MIC values of 0.08 mg/ml against *S. aureus* and *E. coli. Cleome gynandra* had the highest selectivity index against all the bacterial pathogens followed by *Antizoma angustifolia* against *S. aureus*. Our work has indicated that all the nine South African ethnoveterinary plants used in this study are relatively non-cytotoxic and two of them have good antibacterial properties which are noteworthy. Further work will prove the usefulness of these plants and their extracts, or whether pure compounds from these plants may have pharmacological value. Further investigations are necessary for the detailed chemical characterization of the active principles and a more extensive biological evaluation.

Can fluazuron be used at a low dose to control myiasis in sheep when combined with flumethrin?

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Small stock farming and production accounted for approximately 8% of total animal product based agricultural output in the 2008 / 2009 season in South Africa. Blowflies cause damage to sheep hides and frequent death as a result of cutaneous myiasis caused by the larval stages. The two most economically significant blowfly genera in South Africa are *Lucillia* and *Chrysomya*, both belong to the family Calliphoridae. Chemical means of preventing and treating blowfly strike by topical application remains the most widely used method of control. The possible action of a topically applied flumethrin and fluazuron combination against blowflies in sheep was investigated in an in-vitro model. A prior pilot pharmacokinetic study revealed that fluazuron applied topically to sheep is not absorbed systemically, instead remaining strongly dissolved in the lanolin. When applied to sheep pelts at the recommended dose for cattle, the combination failed to show any significant effect against the development of blowfly larvae; however when pure fluazuron was applied to raw meat and larvae allowed to feed, significant effects on pupation and subsequent development were noted. Although fluazuron would appear to be effective at preventing blowfly development, it is not effective when applied to sheep at the dose rate registered for use on cattle. One possible reason is the failure to obtain high enough and effective concentrations in the wool due to the relatively high volume of distribution in the lanolin, skin and wool.

Aetiology of AA-amyloidosis in captive cheetahs (*Acinonyx jubatus*)

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Breeding of cheetahs in captivity is one of many ways to conserve wild cheetah populations because captive-bred, rather than wild caught, cheetahs can be used as pets, in zoological gardens and for re-introduction programmes. Gastritis, associated with Helicobacter spp., is a major worldwide cause of illness, secondary AA-amyloidosis and death in captive cheetahs. Amyloid is a protein deposited in the kidneys and other tissues that interferes with organ function. AA-amyloidosis can develop due to a genetic predisposition or as a side effect of inflammation such as gastritis, inflamed palatine clefts, abscesses or after serious traumatic injury. This study will evaluate birth, death and pathology records of 1000+ cheetahs at the Ann van Dyk Cheetah Centre (born between 1975 and 2010) to establish whether or not treatment of spiral bacteria–associated gastritis with various combinations of antibiotics, immune-modulating drugs and gastric acid secretion suppressors is effective in reducing death due to kidney amyloidosis in cheetahs. This study will also characterise the nucleotide sequence of the cheetah SAA1A & B and SAA3A &B genes from unaffected cheetahs and cheetahs presenting with AA-amyloidosis, in order to detect any single nucleotide polymorphisms in these genes that may be genetically linked to AA-amyloidosis.

Evaluation of the antibacterial activity and cytotoxicity of nine South African medicinal plants against attenuated *Bacillus anthracis*

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Anthrax is a zoonotic disease caused by *Bacillus anthracis*, a Gram-positive spore-forming bacterium. The presence of the bacteria and their toxins in the blood of infected hosts trigger a cascade of pathological events leading to death. Nine medicinal plants traditionally used in the treatment of human and animal infections were tested for their *in vitro* activity against *Bacillus anthracis* Sterne strain. The cytotoxic effect of the extracts on Vero kidney cells was determined. The minimum inhibitory concentration (MIC) values of the extracts against the microorganism ranged from 0.02 to 0.31 mg/ml. Excellent MIC values were observed for the following plant species: *Pittosporum viridiflorum* (0.08 mg/ml), *Bolusanthus speciosus, Hypericum roeperianum* and *Morus mesozygia* (0.04 mg/ml), and *Maesa lanceolata* (0.02 mg/ml) respectively. The total antibacterial activity of the extracts ranged from 92 to 5562 ml/g. *Maesa lanceolata* and *Hypericum roeperianum* had the highest total activity, with values at 5562 and 2999 ml/g respectively. Six of the tested extracts were relatively non-toxic when compared to doxorubicin (LC_{50} = 8.3 ± 1.76 µg/ml). However, extracts of *Maesa lanceolata, Elaeodendron croceum* and *Calpurnia aurea* were toxic with LC_{50} values at 2.38 ± 0.25, 5.20 ± 0.24 and 13 ± 2.26 µg/ml respectively. The selectivity index ranged from 0.02 to 1.66. *Hypericum roeperianum* had the best selectivity index, with SI = 1.66. All the crude extracts showed promising activity against the attenuated *B. anthracis* strain. Investigating the potential of these plant extracts to protect against virulent *B. anthracis* strains *in vivo*, may lead to the development of new therapeutic agents. Evaluating the efficacy of *Maesa lanceolata* and *Hypericum roeperianum* as decontaminants or disinfectants in anthrax control is suggested.

Molecular epidemiology and antimicrobial resistance profiles of *Salmonella typhimurium* isolates from poultry organs and poultry environments in South Africa

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Epidemiological data and antimicrobial resistance patterns of poultry *S. typhimurium* are scanty in South Africa. In this study, *S. typhimurium* isolates (n=141) were screened by PCR for bacteriophages, plasmid and pathogenicity islands (SPIs)-encoded virulence genes (virulotyping) that are essential for invasion (*invA, sopB, gtgB, sspH1, sopE, spvC* and *pefA*), survival (*sifA, gipA, sodC1, gtgE, mig5* and *sspH2*), and serum resistance (*rck* and *srgA*) in the host. *Salmonella typhimurium* isolates underwent DNA fingerprinting by Pulsed Field Gel Electrophoresis (PFGE), and antimicrobial resistance profiling by disk diffusion against 16 antimicrobials. Multi-resistant *S. typhimurium* definitive phage type 104 (DT104) were also investigated. Virulotyping revealed that all isolates (100%) carried SPIs-encoded genes (*invA, sopB* and *sifA*). Bacteriophages-encoded genes occurred as follows: *sspH2* (94%), *sspH1* (90.8%), *sodC1* (90.1%), *gtgB* (88.7%), *gtgE* (81.6%), *gipA* (57.4%) and *sopE* (19%). The prevalence of plasmid-encoded genes was: *pefA* (74.5%), *mig5* (74.5%), *rck* (60.3%), *spvC* (55.3%) and *srgA* (48.2%). Virulotyping profiles (n=59) corresponded largely to PFGE profiles (n=55) and clustered isolates that shared the same sources. Most of the isolates (96.4%) were multidrug resistant (≥2 antimicrobials). Resistance to streptomycin (93.6%), sulfonamides (86.5%), tetracycline (56.7%) ciprofloxacin (90.8%), cefotaxime (44.9%), ampicillin (40.4%), and ceftazidime (40.4%) was observed. Twenty-four percent of isolates were identified as DT104. In conclusion, poultry *S. typhimurium* are genetically diverse suggesting that they were from multiple sources. Likewise, poultry *S. typhimurium* carry virulence genes that are found in isolates usually incriminated in human outbreaks. Furthermore, these isolates were resistant to multiple antimicrobials including those that are used to treat human salmonellosis: ciprofloxacin, cefotaxime, ceftazidime, and ampicillin. Finally, the increasing incidence of multi-resistant DT104 pathotype is a public health concern since DT104 is associated with hospitalizations and deaths. Prudent antimicrobials use and enhanced *Salmonella* monitoring and surveillance systems are recommended to mitigate antimicrobials abuse and ensure food safety for consumers.

Generation of reactive oxygen species in species relevant cell lines as a bio-indicator of the safety of treated acid mine water

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Reactive oxygen species (ROS) production and resultant oxidative stress (OS) has been implicated as a pathway of toxicity in animal species exposed to pollutants. The gills of aquatic animals and the liver and kidneys of mammalian species are specific cellular sites of toxicity. Although the levels of pollutants such as heavy metals found in acid mine drainage (AMD) water can be quantified following treatment, it is unknown whether this is associated with an equivalent reduction in cellular toxicity. ROS production by AMD untreated (U) and after treatment (T) was quantified in a fish gill cell line (RTgill-W1) and in two mammalian cell lines (C3A human liver and Vero monkey kidney). ROS production was determined using the oxidant sensitive fluorogenic probe, 2', 7'-dichlorofluorescein diacetate (DCFH-DA) following exposure to U and T, AMD water. Treatment of AMD water resulted in a reduction in the levels of Al, Zn and Fe while the levels of Mn remained unchanged. For U and T, AMD water a dose-dependent decrease in ROS production was observed. The percentage of ROS formation decreased from 14% to 4.5%, 16.4% to 7.2% and 25.3% to 17.7% in the RTgill-W1, C3A and Vero cell lines respectively exposed to 100% AMD water, U and T. The presence of Mn and subsequent ROS formation indicates that this water is still toxic to cells and further processing may be required. This study shows that the DCFH-DA assay in several cell lines can be used to rapidly bio-monitor the quality of treated AMD water related to the formation of ROS and subsequent cellular effects. However, cutoff levels for cellular toxicity need to be established to ensure the safety of this water for aquatic animals and for animal and human consumption.

A 'hot' *Mycoplasma gallisepticum* and QX-like Infectious Bronchitis virus co-infection model for testing the efficacy of ts-11 and 6/85 vaccines

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Mycoplasma gallisepticum (Mg) causes an economically significant disease of poultry worldwide. The reporting of 12 unique wild Mg genotypes circulating in South African poultry in 2013 could have negative implications for vaccination that is being relied upon for the control of mycoplasmosis. Although Mg alone causes a mild or subclinical disease, co-infection with Infectious Bronchitis virus (IBV) and other poultry pathogens have been reported to act synergistically in exacerbating mycoplasmosis. Several vaccine efficacy studies using Mg strains ts-11 and 6/85 reported them to be efficacious; however, the protective efficacy of these vaccines against current circulating 'hot' Mg strains in South African poultry was not known. An experimental study was conducted using a currently circulating "hot" South African Mg strain and a virulent QX-like IBV South African field strain in SPF chickens with the aim to establish a co-infection challenge model to assess the protective efficacy of vaccines against challenge. Vaccination with ts-11 and 6/85 offered protection against the effects of Mg challenge even in the absence of a systemic humoral response, but IBV co-challenge precipitated clinical signs in a subpopulation of the vaccinated birds. Ts-11 offered a better protection against challenge in contrast to 6/85, which is of relatively higher virulence and immunogenicity. However, vaccination did not inhibit the replication and colonisation of tissues by IBV and/or Mg. Although Mg is a well-known respiratory pathogen of poultry, infection with Mg alone had little or no effect on the cilia of challenged birds. Further work will explore the synergistic relationship between these two pathogens in causing clinical disease.

Comparison of oocyte quality and viability in Nguni and Hereford cattle exposed to a high protein diet

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Ruminants have the unique ability to metabolise and utilise non-protein nitrogen. This allows for an economical, alternative source of protein that does not compete with human resources. However, previous evidence suggests that feeding high levels of protein to support increased demands for growth and production may have a negative impact on reproduction. The Nguni has been previously reported to maintain blood urea concentration more efficiently than other breeds. Researchers have as yet been unable to prove this to be independent of grazing habits. 12 Nguni cows and 10 Hereford herd were block randomised to either a high urea nitrogen inducing diet (HUN group) or a normal urea nitrogen inducing diet (NUN) in a cross-over design. The HUN ration contained feed grade urea up to 200g per animal per day. Trans-vaginal oocyte pick-up (OPU) followed by in vitro fertilisation (IVF) up to day 7 was performed and blood urea nitrogen was measured. Nguni cows on the NUN ration tended to have higher mean BUN levels than Herefords (8.0 and 7.2mg/dL respectively, $P = 0.12$), whereas Nguni cows consuming either 150 or 200g of urea per day had lower BUN levels than their Hereford counterparts (17.5 and 20.0mg/dL, $P < 0.01$). A lower proportion of oocytes reached the morula stage by day 7 in Hereford cows on the HUN ration compared to Hereford cows on the NUN ration during the same period (5/40 vs 16/51, $P = 0.03$). This difference was not apparent in the Nguni cows under the same circumstances. It is concluded that oocyte quality of Hereford cows acutely exposed (first 7 days) to high dietary urea is affected when compared to their Nguni counterparts under the same conditions, and this might be due to Nguni cows' ability to maintain more stable BUN levels during periods of varying dietary urea.

An investigation into the validity of somatic cell count as a diagnostic tool of pathogen specific bovine intramammary infections in composite cow milk samples

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This is an investigation into the validity of the somatic cell count (SCC) test as a diagnostic or survey tool to identify pathogen specific udder infections in cows when used on its own in composite cow milk samples. A SCC cut-off of 200 000 cells/ml is currently recommended by the National Mastitis Council (NMC). Sensitivity, specificity and predictive values were used to assess the validity of the 200 000 cells/ml SCC cut off to detect 19 different mastitis pathogens. This dataset contains micro-cytology results 385 594 composite cow milk samples from in most cases all lactating cows off 860 dairy herds. Cows differed in breed, parity, stage of lactation and milk yield. Whilst over 100 different micro-organisms have been identified as causative agents of mastitis, only a few species of staphylococci, streptococci and Gram-negative organisms are of economic importance. In South Africa most cases of subclinical mastitis are caused by coagulase negative staphylococci (CNS), *Staphylococcus aureus, Streptococcus agalactiae* and *Streptococcus uberis.* The sensitivity of detecting mastitis pathogens at 200 000 cells/ml was low (<60%) and almost similar for all examined, indicating that SCC used at this threshold is not a good indicator of pathogen specific udder infections. Unlike sensitivity, specificity differed greatly between these pathogens. High specificities (>80%) were present when testing for *Staphylococcus aureus* (STH) (lytic group III), *Streptococcus agalactiae, Streptococcus dysgalactiae, Escherichia coli, Klebsiella pneumonia, Serratia* spp, other Gram –ve spp., *Trueperella pyogenes* and *Proteus* spp. Low specificity was shown when testing for CNS, *Staphylococcus pseudintermedius* and *Micrococcus* spp. This indicated that there was little differentiation between them and the pathogen negative milk samples.

The accuracy of pregnancy-associated glycoprotein ELISA tests for early pregnancy diagnosis in South African dairy herds

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The ruminant trophoblast produces pregnancy-associated glycoproteins (PAGs) starting at day 25 after conception and continuing until parturition. These glycoproteins are detectable in the blood and milk of pregnant females and can be used to diagnose and monitor pregnancy in cattle, small stock and buffaloes. The objective of the study was to estimate the accuracy of three enzyme-linked immune-sorbent assays (ELISA) for PAGs relative to transrectal ultrasonography (TRUS) as a gold standard. A multicentre prospective study was conducted in five sites within South Africa utilizing the assistance of experienced veterinary practitioners. Milk and blood samples were sampled from 919 dairy cows and heifers at 28-35 after AI and repeated two weeks later. Transrectal ultrasonography was performed immediately after sample collection. Milk and blood were transported by overnight courier to the laboratory and were stored at 4^0C and -20^0C, respectively until analysis. The milk and blood samples were analysed with commercial ELISA kits. Sensitivity and specificity were reported with mid-P exact 95% confidence intervals (CI). Results for sensitivity (95% CI) of the serum, milk and visual ELISA were 99.6% (98.5%-99.9%), 99% (97.6%-99.7%), and 99.4% (98.2%-99.9%), respectively. Specificity for the serum, milk and visual ELISA were 48.5% (43.8-53.3%), 51% (46.3%-55.8%) and 51.3% (46.5%-56%), respectively. In conclusion, the PAG ELISA was a sensitive test for detecting pregnancy relative to TRUS from days 28-35 and 42-49 after breeding but poorly specific in identifying non-pregnant cows.

An investigation into various somatic cell count thresholds as indicators of bovine intramammary infection status in quarter and composite cow milk samples

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This study of quarter and composite cow milk samples investigated the use of SCC as a diagnostic tool to test the validity of current somatic cell count (SCC) threshold of 200 000 cells/ml suggested by industry as an indicator of general intramammary infections (IMI). The objectives of this study were to determine at various SCC levels sensitivity, specificity, predictive values and likelihood ratios to assess the efficacy of SCC to identify IMI and to determine "optimum" cut-off SCC thresholds to indicate IMI of both quarter and composite cow milk samples. This dataset contains micro-cytology results of 89 638 quarter and 385 594 composite cow milk samples from in most cases all from lactating cows of 860 dairy herds. Cows differed in breed, parity, stage of lactation and milk yield. In quarter milk the percentage samples from which bacteria was isolated at 100 000 and 200 000 cells/ml SCC levels did not differ much nor did they differ from the 18.3% IMI positive composite cow samples at the 200 000 cells/ml level. At 200 000 cells/ml higher sensitivity was achieved in quarter milk and specificity in cow milk samples. At the same SCC level for every one quarter infected 4.34 were not and for every 1 udder infected 1.13 were uninfected. The probability for detecting IMI at 200 000 cell/ml was very low at 50.0% in quarter and 62.4% in cow milk and for detecting uninfected quarters 81.3% and uninfected udders 69.4%. To detect intramammary infection, quarter level SCC assessment was better than that at cow level. The optimum SCC cut-off levels determined were 250 000 and 150 000 cells/ml in quarter and composite milk respectively. SCC alone to predict the presence of IMI is not ideal.

Does the hatching percentage of Nile crocodile (\) eggs depend on microbial content in incubation boxes and eggs?

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Some South African Nile crocodile farms have a problem with low hatching rates. Beside other causes, microbial contamination can cause poor hatchability of crocodile eggs. We determined whether there exist a negative correlation between aerobic bacterial and fungal colony counts, respectively, in incubation boxes, before each received a separate clutch of eggs for incubation, with the hatching rate obtained from each after incubation and hatching. We determined whether colony counts of the 20 boxes eventually yielding the lowest hatching rates were higher than those of the 20 with the highest hatching rates. On the day of hatching, we determined whether each of two eggs that failed to hatch from each of the 10 boxes with the lowest hatching rates contained an aerobic, anaerobic or fungal species not present in either of two unhatched eggs from any of the 10 boxes with the highest hatching rates. A negative correlation existed between the number of fungal colonies in boxes before they were loaded with eggs and the percentage of eggs that hatched from each ($P < 0.05$). Bacterial colony count before hatching was not correlated with hatching rate ($P > 0.05$). Boxes with the highest hatching rate had fewer bacterial colonies than those with the lowest hatching rate ($P = 0.048$) and tended to have fewer fungal colonies ($P = 0.055$). No two unhatched eggs from any box with a low hatching rate contained any aerobic, anaerobic or fungal species that did not also occur in unhatched eggs from boxes with high hatching rates. This study shows that there is a tendency that clutches placed into boxes with higher microbial loads yield lower hatching rates. This study provides no support for any aerobic, anaerobic or fungal species present in eggs on the day of hatching that are associated with failure to hatch.

Leptospirosis in South African horses – what is out there?

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Leptospirosis in horses often occurs without noticeable clinical signs; however, acute disease manifestations as well as reproductive failure and recurrent uveitis have been reported. In South Africa, the epidemiology of the disease in horses is not well documented. This study determined the serovars of *Leptospira* present in horses in Gauteng, Kwazulu Natal and Western Cape and associated risk factors. A serosurvey, comprising 663 horse sera collected by four large equine hospitals, was carried out using the microscopic agglutination test. Owners were interviewed to obtain information on associated risk factors. The most predominant serovars in Gauteng were Bratislava [32%, 95% CI: 29-35%]; Djasiman [10.4%, 95% CI: 8-12%] and Arborea [8.9%, 95% CI: 7-11%], in the Western Cape province, Bratislava [27.35%, 95% CI: 23-32]; Djasiman [15.4%, 95% CI: 12-19%] and Arborea [14.5%, 95% CI: 11-18%] and in Kwazulu Natal, Bratislava [39.4%, 95% CI: 34-44%]; Arborea [9.6%, 95% CI: 7-13%]; and Tarassovi [7.7%, 95% CI: 5-10%] respectively. The proportion of positive horses to one or more serovars of *Leptospira* at a serum dilution of 1:100 in the Gauteng, Kwazulu Natal and Western Cape provinces were 49% (95% CI: 24-74%); 37% (95% CI: 19.5-53.7%) and 32% (95% CI: 26-39%) respectively. Twenty one serovars representing 18 serogroups were detected in South African horses with serovar Bratislava being the most serodominant. Presence of rodents on the property, sugarcane fields and pigs in the vicinity of horse-properties and high temperature and rainfall were risk factors associated with horses being seropositive to serovar Bratislava ($P<0.05$). This study has shown that a high proportion of horses in South Africa are exposed to a wide range of serovars, inferring a complex epidemiology. It also describes for the first time new serovars of *Leptospira* in horses in South Africa that have not previously been reported.

The emergence of genotype XVII strains of Newcastle disease virus in Nigerian poultry

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Newcastle disease is endemic in Nigeria and outbreaks caused by virulent Newcastle disease virus (NDV) were first reported in 1953. Since then epidemics in both commercial and village chickens have continued. Viruses isolated during these early outbreaks were analyzed and identified by *in vivo* pathogenicity tests; their molecular characteristics are largely unknown. Molecular characterization of Newcastle disease viruses from Nigeria started just recently following analysis of samples recovered from commercial farms, slaughter slabs and live bird markets. Results of these studies identified novel strains of virulent NDV circulating in Nigeria from 2006-2011. These strains were designated as new genotypes; XIV, XVII and XVIII which are unique to the West and Central African region. Full genome sequencing of selected historical Nigerian Newcastle disease viruses in the repository of the National Veterinary Research Institute, Vom, Nigeria, recovered before 2006 from backyard poultry was generated. Phylogenetic reconstruction and evolutionary distances based on sequences of the full fusion (F) gene revealed a grouping with genotype XVII; an indication that genotype XVII has been circulating in Nigerian poultry for much earlier than anticipated. This study describes the evolution of NDV in this region and highlights the need for continuous surveillance of NDV for the detection of emerging strains.

On reconstructing *Giraffa sivalensis*, an extinct giraffid from the Siwalik hills, India

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Giraffa sivalensis occurred during the Plio-Pleistocene and represents the terminal species of the genus in southern Asia. The holotype is a cervical vertebra of disputed anatomical location. Although there is also uncertainty as to this animal's size, other specimens have been assigned to this species including fragments of two humeri, a radius, metacarpi and teeth. We estimated *G. sivalensis* neck length, leg length and body mass using interspecific and, unusually, ontogenetic allometry of extant giraffe skeletal parameters. The appropriateness of each equation to estimate body mass was evaluated through the prediction error incurred in both extant giraffes and okapis. It followed that the equations with the lowest prediction error in both species were considered robust enough to use in *G. sivalensis*. The size of *G. sivalensis,* based on the holotype, is proposed as 400 kg (range 228 kg - 575 kg), with a neck length of about 147 cm and a height of 390 cm. The molar lengths of tooth specimens considered agree with this size estimate. The humerus was the most appropriate long bone to establish body mass which estimates a heavier animal of ca 790 kg. The discrepancy with the vertebral body weight estimate might indicate sexual dimorphism. Radial and metacarpal specimens estimate *G sivalensis* to be as heavy as extant giraffes. This may indicate that the radius and metacarpus are unsuitable for body mass predictions in *Giraffa spp*. Alternatively, certain long bones may have belonged to another long legged giraffid that occurred during the same period and locality as *G. sivalensis.* We have concluded that if sexual dimorphism was present then males would have been about twice the size of females. If sexual dimorphism was not present and all bones were correctly attributed to this species, then *G sivalensis* had a slender neck with a relatively stocky body.

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Research and Teaching Awards: 2013

Counter-clockwise from top right:

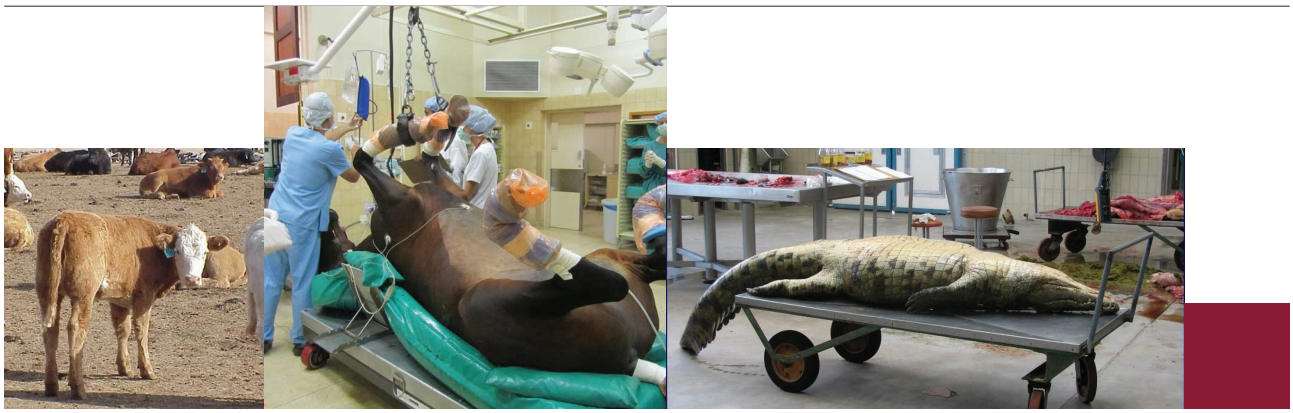
Dr Patrick Page (right) was elected as Lecturer of the Year in 2014. The award was handed to him by the Dean, Prof Darrell Abernethy (left).

Prof Peter Thompson (right) was elected as Bayer Researcher of the Year in 2014. The award was presented to him by Dr Clint Austin from Bayer (left).

Prof Louis J Guillette Jr, Professor of Obstetrics and Gynaecology, presented the 2014 Arnold Theiler Memorial Lecture.

Prof Darrell Abernethy (left), Dean of the Faculty, presents Prof Louis J Guillette Jr (right) with the Faculty Day Lectori Salutem certificate after he delivered the 2014 Arnold Theiler Memorial Lecture.

Prof Andre Ganswindt (right) received the 2014 Nurse's Lecturer of the Year Award, presented to him by the Dean, Prof Darrell Abernethy (right).



Faculty Day 2015: Committees

Organising Committee

Prof Andre Ganswindt (Chairperson/Scientific Committee)
Prof Darrell Abernethy (Dean)
Prof Vinny Naidoo (Member)
Prof Marinda Oosthuizen (Member)
Dr Leith Meyer (Member)
Ms Rene Perridge (Member)
Mr Chris van Blerk (Member)
Sr Sarah Johnson (Member)
Ms Fransie Lottering (Member)

Master of Ceremonies

Prof Andre Ganswindt

Scientific Committee

Prof Andre Ganswindt
Dr Martina Crole
Dr Leith Meyer
Dr Patrick Page
Dr Dayo Fasina
Dr Melvyn Quan

Adjudicators Oral and Posters:

Prof Gerry Swan
Prof Nick Kriek
Prof Koos Coetzer
Prof Vinny Naidoo
Dr Henry Annandale
Dr Daan Verwoerd
Prof John Soley
Prof Mary-Lou Penrith
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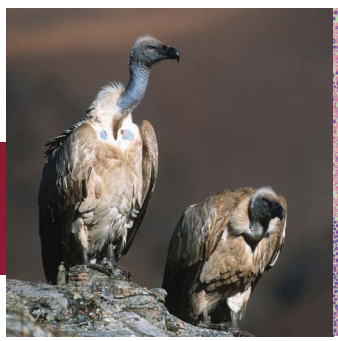
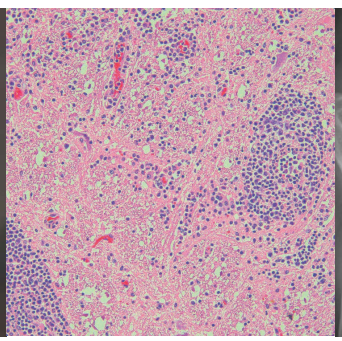
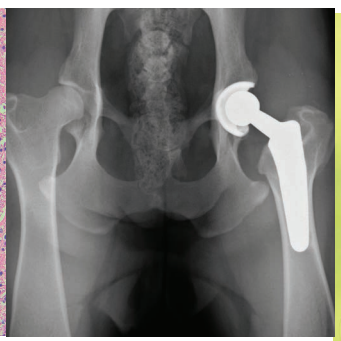


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