

AVTRW
The Association for Veterinary
Teaching and Research Work



12-13 September
University of Surrey, Guildford

CONFERENCE 2017

AVTRW Annual Meeting 2017

Association of Veterinary Teaching and Research Workers
School of Veterinary Medicine, University of Surrey



Table of Contents

Meeting Program	3
AVTRW Joining Instructions	7
Selbourne Award	8
Keynote Biographies.....	9
Oral Abstracts	10
Poster Abstracts.....	24

Meeting Programme

Tuesday 12th September

- 12:00-12:50 Registration and lunch
12:50-13:00 Welcome address (Dr Martha Betson, AVTRW President)
13:00-13:15 Welcome to School of Veterinary Medicine (Prof Peter Cockcroft & Dr Dan Horton)

Scientific session 1: 13:15-15:00

Chair: Dr Robin Flynn

- 13:15-13:30 Selborne Award Introduction (Dr Tom McNeilly)
13:30-13:45 Selborne Award Presentation to Dr Hugh Reid
13:45-14:00 O1: Hannah Wickenden (The Royal Veterinary College)
Title: New insights into the biology of the equine tapeworm, *Anoplocephala*, and the oribatid mite intermediate host
14:00-14:15 O2: Lauren E. Black (Moredun Research Institute)
Title: Lesion profiles and parasite distribution in tissues from mice inoculated with Brazilian and Caribbean *Toxoplasma gondii* isolates
14:15-14:30 O3: Eve Hanks (University of Glasgow)
Title: Analysis of the anti-glycan response to *Haemonchus contortus* Barbervax vaccine to aid development of a future recombinant protein vaccine with tailored glycosylation
14:30-14:45 O4: Parul Sharma (University of Liverpool)
Title: Innate immune response to *Neospora caninum* infection of cattle
14:45-15:00 O5: Katie A. Hildersley (University of Glasgow & Moredun Research Institute)
Title: Investigating the presence of Tuft cells in ovine abomasum tissue following parasitic nematode infection

Poster Session 1: 15:00-16:00

Scientific Session 2: 16:00-17:20

Chair: Dr Steve Dunham

16:00-16:35 Invited speaker 1: Prof Roberto La Ragione (University of Surrey)

Title: Antibiotic resistance in the food chain; A one health issue

16:35-16:50 O6: Alexandra Tonks (University of Reading)

Title: Effects of bedding supplementation on the performance and caecal microbiome of birds fed a wheat-based diet

16:50-17:05 O7: Maria Bravo-Santillana (University of Surrey)

Title: Potential use of lactic acid bacteria as probiotics to control bovine TB in wildlife

17:05-17:20 O8: Rebecca Daines & Rebecca Moore (University of Surrey & The Pirbright Institute)

Title: Characterising the interplay of infectious bursal disease virus (IBDV) and gut bacteria

Conference reception: 17:30-18:30

Evening meal: from 19:00

Venue booked from for evening meal and social event

The Three Pigeons

High Street

Guildford GU1 3AJ

<https://www.craft-pubs.co.uk/threepigeonsguildford>

Wednesday 13th September

Scientific Session 3: 09:00-10:35

Chair: Dr Tom McNeilly

09:00-09:35 Invited speaker 2: Dr Bryan Charleston (The Pirbright Institute)

Title: Designing new vaccines for disease control

09:35-09:50 O9: Sharmini Paramasivam (University of Surrey)

Title: Modern monkeys – understanding human-monkey interaction at an urban ecotourism site

09:50-10:05 O10: Nicola Gladden (University of Glasgow)

Title: Behavioural effects of post-partum pain relief in calves born with and without assistance

10:05-10:20 O11: Ulrike Mauchle (The Royal Veterinary College)

Title: Improved diagnosis of Canine Infectious Respiratory Disease in dogs

10:20-10:35 O12: Jamaliah Binti Senawi (The Pirbright Institute)

Title: Sensitivity of IB-RS-2 cells: does persistent infection with classical swine fever virus impact upon foot-and-mouth disease virus serological responses?

Poster session 2: 10:35-11:30

Scientific Session 4: 11:30-12:15

Chair: Dr Henny Martineau

- 11:30-11:45 O13: Verity Horigan (Animal and Plant Health Agency)
Title: A qualitative risk assessment to support a review of the requirements for secondary cleansing and disinfection after a notifiable avian disease outbreak
- 11:45-12:00 O14: Joana Rodrigues (Anglia Ruskin University)
Title: Prevalence of fluoroquinolone-resistant *Salmonella* spp. in bird faeces around the river Cam and the associated public health risks
- 12:00-12:15 O15: Diane Lee (University of Surrey)
Title: A bovine alveolus model to replace cattle in the study of host-pathogen interactions in bovine tuberculosis

Career Development Session: 12:30-13:30

Vicki Adams (Editor: Veterinary Record Open)

How to write a scientific paper? An interactive workshop starting about writing a scientific paper for publication in a peer reviewed journal. Potential participants can view a previous webinar here: <https://youtu.be/qPe0a0qRBpQ>

Lunch: 13:30-14:00

AVTRW annual general meeting: 14:30-15:30

Meeting is open to all conference participants and AVTRW members



AVTRW Joining Instructions

Do I have to be a vet to join?

No. Members may be either veterinarians or other graduates who have a major interest in either Veterinary Research or Teaching. Currently, members range through:

- Academic staff in many veterinary and non-veterinary faculties
- Research workers in both universities and research institutions
- Medical researchers with particular interests in the veterinary field
- Veterinary investigation officers
- Individuals in commerce and diagnostic laboratories

How do I join?

Please download and complete the application forms from our website - full instructions and an overview of the procedure are provided on the first page of the document:

- Download Word Version
http://www.avtrw.co.uk/index.php/download_file/view/45/125/
- Download PDF Version
http://www.avtrw.co.uk/index.php/download_file/view/42/125/
- Once your membership application is received and processed, you will begin to receive Association correspondence and notice of future meetings and will be eligible for all benefits and discounts that are available to AVTRW members. Your membership will be classified as provisional until it is either ratified or declined at the next Annual General Meeting of the full Association following your application. Should your application be declined, your membership joining fee will be refunded.

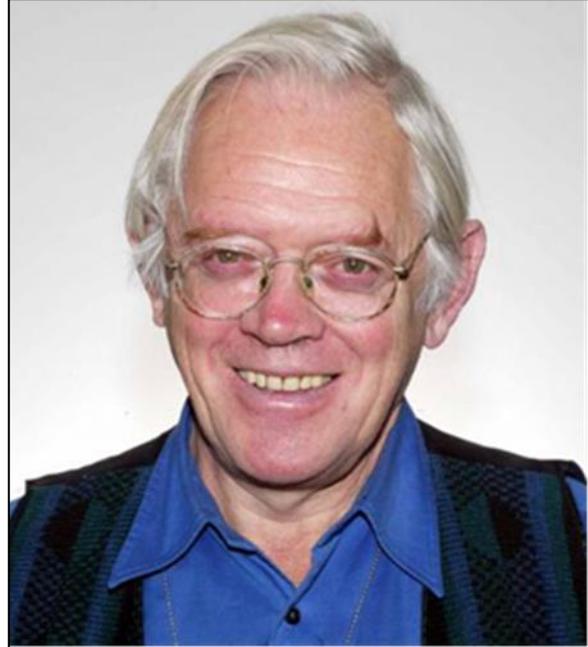
How much does it cost?

- Annual membership is currently £25 sterling when paid by standing order from a UK bank, or £26 when paid by PayPal.
- Applicants that are registered as a student (undergraduate or postgraduate) at the time of application will receive three years membership for the price of the membership joining fee. Thereafter the annual fee is as above.
- Note that conference costs are kept low to encourage attendance, and participation from students is actively encouraged.

Selbourne Award 2017

The Selbourne Award is given to those who have made an outstanding contribution to advancements in Veterinary Research.

This year's recipient is Dr Hugh Reid of the Moredun Research Institute. Hugh graduated from the Royal (Dick) Vet School, Edinburgh in 1966 and began his career at Moredun in 1968, gaining his PhD in 1975 producing a thesis entitled "A Study of the Pathogenesis of Louping-ill". Hugh worked at the Moredun Research Institute for over 30 years retiring as head of virology in 2002. His early work focused on Louping ill, where he worked alongside Peter Doherty, later to become a Nobel Laureate, and included having to confirm a laboratory acquired infection with Louping-ill virus when Peter accidentally self-inoculated himself. Secondments to Kenya and Indonesia stimulated his interest in MCF, with Hugh realising the importance of this disease to the fledgling deer farming industry in Scotland and, after his official retirement in 2002, Hugh stayed on for another 10 years to help address many of the issues which arose following the emergence of TSEs as a health threat. Hugh was recognised for his work in virology by an award of MBE in 2002. Over the course of his career Hugh has authored over 200 peer-reviewed publications, helped maintain Louping Ill vaccine supplies and served as mentor to numerous scientists.



Speaker Biographies

Professor Roberto La Ragione

Roberto graduated in 1995 and in 1996 he moved to the government Veterinary Laboratories Agency to undertake a PhD on the pathogenesis of *E. coli* in poultry. In 2005 Roberto was appointed head of pathogenesis and control at the AHVLA and in 2010 he was appointed Professor of Veterinary Microbiology and Pathology at the University of Surrey. His current research focuses on AMR transmission and the pathogenesis of food-borne pathogens with a particular interest in the development of rapid diagnostics and intervention strategies including vaccination, pre and probiotics for the control of bacterial pathogens in animals.



Professor Bryan Charleston

Prof Charleston obtained a BVetMed from the Royal Veterinary College, University of London, UK in 1982. After a period of time in Large Animal Practice, he completed a Masters degree in Molecular Biology at University College London in 1988, followed by a PhD degree, as a Wellcome Trust Scholar, from the University of London in 1991. He is currently the Director at the Pirbright Institute. His research group's efforts are focused on understanding the immune response to Foot-and-Mouth disease virus in cattle to develop novel vaccines.



Dr Vicki J. Adams

Vicki attended the University of British Columbia before receiving her DVM from the Western College of Veterinary Medicine in 1990. After completing an internship at the University of Minnesota she worked in small animal practice before returning to the University of Saskatchewan in 1997 to complete MSc and PhD degrees in epidemiology. Vicki joined the Animal Health Trust in 2003 and became Head of Small Animal Epidemiology until 2009. Since then she has been self-employed, continuing to do collaborative research whilst also being editor of Veterinary Record Open and acting chief executive for the Animal Cancer Trust charity.



Oral Abstracts

Scientific session 1: 13:10-15:05

Chair: Dr Robin Flynn

O1: New insights into the biology of the equine tapeworm, *Anoplocephala*, and the oribatid mite intermediate host.

Hannah Wickenden¹, Corrine Austin², Paul Davis², Kim Stevens¹, Damer Blake¹, and Mark Fox¹

1-The Royal Veterinary College, 2-Austin Davis Biologics Ltd

Three species of equine tapeworm are found in the British Isles, the most common being *Anoplocephala perfoliata*. Horses become infected by ingesting pasture (or oribatid) mites, which act as the parasite's intermediate host and harbour the tapeworm larva (or cysticercoid). Here we report a study investigating seasonal fluctuations in mite numbers on pasture in addition to monitoring the intensity of tapeworm infection in grazing horses on three equine yards. Each yard was visited at four week intervals, between June 2016 and August 2017, when three pastures were vacuum sampled for mites. Three, one metre-square tetrads and grass around ten dungpats were sampled on each of the three pastures. At the same time, saliva samples were collected from horses kept at each yard (range, 10 - 23 horses sampled/month/yard) and tapeworm status assessed using EquiSal Tapeworm saliva testing (Austin Davis Biologics Ltd). A linear mixed-effects regression model was used to identify factors significantly associated with increasing EquiSal saliva score. Factors included yard, grazing pattern, month, horse age, breed and days since start of the trial. These analyses should enable us to (1) understand the relative importance of different risk factors associated with infection; and (2) improve current tapeworm control measures by (a) assessing the need for regular testing and anthelmintic treatment as required; and (b) reviewing pasture management practices (horse turnout dates and times, dung removal) in light of patterns of exposure to infection and parasite status.

O2: Lesion profiles and parasite distribution in tissues from mice inoculated with Brazilian and Caribbean *Toxoplasma gondii* isolates

Lauren E. Black^{1,2}, Clare M. Hamilton¹, Daniela P. Chiebao³, Paul M. Bartley¹, Tanja Lepore¹, Alison Burrells¹, Elisabeth A. Innes¹, Patrick J. Kelly⁴, Javier Palarea-Albaladejo⁵, Frank Katzer¹, and Francesca Chianini¹

¹Moredun Research Institute, Pentlands Science Park, Bush Loan, Edinburgh, EH26 0PZ, United Kingdom. ²College of Medical Veterinary and Life Sciences, Wolfson Medical School Building, University of Glasgow, University Avenue, Glasgow G12 8QQ, United Kingdom. ³Agência Paulista de Tecnologia dos Agronegócios, São Paulo State Agricultural and Supply Department, Rua Antônio Gomes Morgado, 340, CEP 18013-440 Sorocaba, São Paulo, Brazil. ⁴Ross University School of Veterinary Medicine, Basseterre, St. Kitts, West Indies. ⁵Biomathematics & Statistics Scotland (BioSS), Edinburgh, United Kingdom.

Many strains of the protozoan parasite *Toxoplasma gondii* (*T. gondii*) are reported to cause pathology with varying levels of severity in different hosts. Despite the worldwide importance of this zoonotic disease, its pathogenesis is not completely understood. The main aim of this study was to investigate lesion characteristics and parasite distribution in mice infected with different strains of *T. gondii* from the U.K., Brazil and the Caribbean.

The samples for this work came from two previous studies carried out at the Moredun Research Institute. In study one, 3 groups of mice were inoculated with the Moredun, U.K., isolate (M4), and two isolates from Brazil, BrI (Toxo DataBase genotype #6) and BrIII (#8) (one group per isolate). In study two, 6 atypical field isolates from Saint Kitts, Caribbean, the U.K. (M4) isolate and one Brazilian isolate (BrI) were inoculated into 8 groups of mice (one group per isolate). All mice were culled post inoculation and several tissues were collected and processed for histological and immunohistochemical analysis. Slides were examined using a scoring system developed for this study.

Results indicated that lung and liver from infected individuals regularly showed lesions and parasite presence across all isolates. Mortality and *T. gondii* presence were not always associated with severe pathology. Interestingly, lesions and parasite were occasionally found in the kidney, an organ not extensively studied in toxoplasmosis research. This investigation will help to understand the different degrees of virulence observed in various *T. gondii* strain infections.

O3: Analysis of the anti-glycan response to *Haemonchus contortus* Barbervax vaccine to aid development of a future recombinant protein vaccine with tailored glycosylation

Eve Hanks¹, David Smith², George FJ Newlands², Alasdair J Nisbet², Tom N McNeilly², Stewart T G Burgess², Cornelis H Hokke³, Angela van Diepen³, and Collette Britton¹

¹Institute of Biodiversity, Animal Health and Comparative Medicine, University of Glasgow College of Medical, Veterinary and Life Sciences, Garscube Campus, Bearsden Road, Glasgow G61 1QH, UK, ²Moredun Research Institute, Pentlands Science Park, Penicuik, Edinburgh EH26 0PZ, UK and ³Department of Parasitology, Leiden University Medical Center, Glycobiology Group, Albinusdreef 2, 2333 ZA Leiden, Netherlands

Haemonchus contortus is a highly pathogenic, blood feeding, gastrointestinal nematode of small ruminants. High levels of protective immunity can be achieved against challenge infection by vaccinating sheep with the native *H. contortus* glycoprotein vaccine Barbervax®. However, vaccination with recombinant protein antigens have conferred little or no protection. This suggests that the recombinant proteins may be incorrectly folded or may lack the proper post-translational modifications. Up to 90% of the antibody reactivity induced by Barbervax is to glycan components of the major gut glycoproteins. However, it is not known if these anti-glycan antibodies are protective. To investigate the relevance of Barbervax® glycan antigens in vaccine-induced immunity we first performed a detailed analysis of the glycan structures present on Barbervax® glycoproteins. Then, glycan microarrays generated from the isolated glycan structures, and selected synthetic glycans, were screened with serum antibodies from vaccinated sheep. Glycan recognition profiles from the best and least protected animals were analysed and showed differences in recognition patterns and magnitude of response between these two groups, with statistically significant differences present in the reactivity towards synthetic glycans. This study provides new information on the kinetics of anti-glycan responses following vaccination and identifies specific glycans that may be associated with protection induced by Barbervax. Glycans that appear to correlate with protective immunity can be synthesised and tested in future work as a potential synthetically defined vaccine.

Alternatively, glycan antigens that contribute to the protective immunity can be engineered on recombinant glycoproteins to better mimic the effective native gut glycoprotein vaccine.

O4: Innate immune response to *Neospora caninum* infection of Cattle

Parul Sharma^{1,2}, Sharon Egan¹, and Robin J. Flynn²

¹University of Nottingham, School of Veterinary Medicine and Science, Sutton Bonington Campus, Leicestershire, UK, LE12 5RD ²University of Liverpool, Institute of Infection and Global Health, Liverpool Science Park, Liverpool, UK, L3 5RF

Neospora caninum is an intracellular protozoan parasite which causes abortion in cattle and neuromuscular disease in dogs. Bovine infection can be initiated in utero or after birth through ingestion of infectious material. Our previous studies have shown differences in young monocytes compared to adult in terms of cytokine responses and expression of CD80. In this study we investigated if there was an age dependent effect on invasion of monocytes and their subsequent interaction with NK cells during *N. caninum* infection.

Naïve CD14⁺ and NK-cells cells were isolated from peripheral blood mononuclear cells (PBMCs) from young and adult cattle by magnetic cell separation. Monocytes were sequentially infected with NCLiv-1 isolate of *N. caninum* tachyzoites labelled with CFSE before co-culture with NK cells. The number of infected cells was determined post-culture and CD80 expression, as a marker of cellular activation, was determined by flow cytometry.

There was an age-related variation in infection of monocytes with cells derived from old animals more likely to harbour greater numbers of parasites. A reduction in parasite numbers post culture with NK cells was observed in both young and adult cattle with increased CD80 expression also observed. The greater uptake of parasites into monocytes in combination with NK-cell interaction inhibits parasite multiplication and may be one mechanism to explain the age-related differences in innate immune response to intracellular parasitic (*N. caninum*) infection.

O5: Investigating the presence of Tuft cells in ovine abomasum tissue following parasitic nematode infection.

Katie A. Hildersley, Collette Britton, Eileen Devaney, David Frew, Jeanie Finlayson, Francesca Chianini, and Tom N. McNeilly

University of Glasgow, Moredun Research Institute

Tuft cells have recently been found to play an important role in the initiation of the Type 2 T helper (Th2) immune response to gastro-intestinal parasitic infections in mice. Specific tuft cell markers have been used to demonstrate the expansion of tuft cells over the course of an infection, as part of a 'feed-forward loop' with Group 2 Innate Lymphoid Cells. This project aimed to determine whether specific murine tuft cell markers are also expressed in the abomasal epithelium of sheep, and if so, whether an expansion of cells expressing these markers was observed during an infection with the ovine gastro-intestinal nematode *Teladorsagia circumcincta*. Antibodies to murine tuft cell markers POU2F3, DCLK-1 and TRPM5 were tested by immunohistochemistry on ovine tissues and anti-POU2F3 was found to give a strong specific signal on putative tuft cells in the ovine abomasal epithelium. The percentages of POU2F3⁺ epithelial cells in the ovine abomasum prior to, and during *T. circumcincta* infection showed similar increases to studies in the mouse suggesting that

POU2F3+ cells in the ovine abomasum are tuft cells. Further investigations are required to address the specificity of anti-DCLK-1 and anti-TRPM5 for putative ovine tuft cells. This project has taken the first steps in identifying markers of ovine tuft cells, laying the groundwork for future investigation of the role of tuft cells in the ovine Th2 response.

Scientific Session 2: 16:00-17:20

Chair: Dr Steve Dunham

IS1: Antibiotic resistance in the food chain; A one health issue.

Professor Roberto La Ragione

School of Veterinary Medicine, Faculty of Health and Medical Sciences, University of Surrey, Guildford, Surrey, GU2 7AL, UK

Antibiotics are critical for treating infections in human and veterinary medicine and increasing resistance in bacteria is considered a major global health threat, therefore alternatives are urgently required. Minimising the unnecessary and inappropriate use of antibiotics can reduce the selective pressure that favours the emergence and spread of resistant bacteria and is an essential component of strategies to safeguard antibiotics critical for treatment of serious human and animal infections. Furthermore, understanding the transmission dynamics of antimicrobial resistance (AMR) is essential if suitable alternatives are to be developed.

Antibiotic resistant bacteria from animals and humans can transmit in both directions, through human contact with farm, wildlife or companion animals or their environments, through ingestion of contaminated food (both imported and local produced animal and vegetable or fruit items) and through contact with effluent waste from humans, animals and industry. Furthermore, the acquisition of AMR can influence the pathobiology of many pathogens including virulence, metabolism and persistence in the environment.

This presentation will focus on the current issues surrounding antimicrobial resistance (AMR) including the drivers of AMR, dosing regimens and the development of novel alternatives to antimicrobials including pre and probiotics, and novel antimicrobials for important zoonotic bacterial pathogens.

O6: Effects of bedding supplementation on the performance and caecal microbiome of birds fed a wheat-based diet.

Alexandra A Tonks, Martin J Woodward, and Caroline Rymer

Animal, Dairy and Food Chain Sciences, School of Agriculture, Policy and Development, University of Reading, UK

The gut microbiome of broilers is heavily influenced by numerous factors including bedding and environment: colonisation of the gastrointestinal tract begins at hatch where birds ingest bacteria and the microbiome develops in a successional manner. It is hypothesised that reusing bedding can influence the development of a stable microbial population, thus this study investigated the effects of supplementing bedding with excreta on the caecal microbiome. Birds were housed on either fresh shavings, or shavings supplemented with excreta from healthy adult birds (50 g per 1x1.5 m pen). Samples of caecal digesta (n=6 birds per treatment) were taken at 15 and 22 days of age and the microbiome was profiled through 16S rRNA sequencing on the Illumina platform. Feed conversion ratio and daily liveweight gain were also calculated: no differences in performance data were identified. A number of bacterial taxa were differentially represented within each treatment group at day 15 ($P < 0.05$), including Lachnospiraceae and Clostridiaceae, with large differences in the most abundant families. Alpha diversity was also significantly heightened in samples from birds on

supplemented bedding ($P < 0.001$). Conversely no differences were identified at day 22 ($P > 0.05$). It was observed that day 15 supplemented samples were more similar to fresh samples taken at day 22 with no statistically significant differences in either OTU abundance or alpha diversity. These results suggest that not only does the supplementation of bedding with excreta from healthy adult birds accelerate the development of a stable, adult microbial population, but there is no relationship with bird growth.

O7: Potential use of lactic acid bacteria as probiotics to control bovine TB in wildlife

Maria Bravo-Santillana and Jorge Gutierrez-Merino

School of Biosciences and Medicine, University of Surrey

Bovine tuberculosis (bTB) is a chronic bacterial disease mainly caused by *Mycobacterium bovis* that leads to significant economic losses worldwide. bTB has been eradicated from many European nations but it is still very prevalent in some countries where wildlife reservoirs of *M. bovis* have been confirmed. This is the case of wild boar (*Sus scrofa*) and the European badger (*Meles meles*). Lactic acid bacteria (LAB) have been proposed as a new alternative for controlling bTB due to their probiotic properties, which include their ability to: (1) inhibit the growth of *Mycobacterium* species; and (2) trigger beneficial host immune responses. The main objective of this study has been the probiotic characterization of LAB isolated from faeces of wild boar and badgers to evaluate their potential as an environmentally friendly alternative against bTB. LAB have been isolated and identified as *Pediococcus* spp., *Lactobacillus* spp., *Enterococcus* spp. and *Weissella* spp. Overall, the isolates have shown significant antimycobacterial activity and seem to be associated with innate immunomodulation. Some of the isolates have induced NF- κ B activation in macrophages, suggesting a potential role as vaccine adjuvants or boosters of Th1 immune response; whereas other isolates have showed potential anti-inflammatory properties as they suppress NF- κ B activation. Further studies such as whole-genome sequencing and antibiotic resistance tests have confirmed the potential use of our LAB isolates as probiotics. Our data suggest that LAB could be used as an early therapy and/or vaccine adjuvants to reduce or prevent infection but also as a tool to reduce inflammation and the amount of viable excreted mycobacteria in highly infected animals. These measures could indeed lead to a long-term decrease in the prevalence of bTB in wildboar and badgers.

O8: Characterising the interplay of infectious bursal disease virus (IBDV) and gut bacteria

Rebecca Daines, Rebecca Moore, Prof. Roberto La Ragione, Dr. Daniel Horton, and Dr. Andrew Broadbent

University of Surrey & The Pirbright Institute

Infectious bursal disease virus (IBDV) is a highly contagious virus of chickens that is spread faeco-orally, causing diarrhea and systemic symptoms such as ruffled feathers, lethargy and weight loss. In severe cases infection can cause death. The virus infects and destroys B lymphocytes, leading to immunosuppression which makes the birds more susceptible to secondary infections many of which are in the gut.

This presentation has two parts:

A. Does IBDV infection alter the microbiome of the gut? Mucosal IgA is known to be important in controlling the composition of the gut microbiome and as IBDV destroys B cells,

we hypothesise that IBDV infection causes the composition of the gut microbiota to be altered. To test this, we will observe the alteration of the gut microbiome pre/post-infection by IBDV. Focusing on the caecal tonsils, the microbiota will be characterised from tissue samples and viral titre established.

B. Do gut bacteria interact with IBDV and influence viral infectivity/replication? Bacterial components are known to influence the replication of enteric viruses, for example polio and rotavirus. As IBDV infects the gut, we hypothesise that the presence of certain bacterial components alters the infectivity of IBDV in the gut of chickens. To test this, we will identify if bacterial components affect infectivity of IBDV. LPS, flagellin, GLCNAC and peptidoglycans will be incubated with IBDV and added to live cells, to identify any enhancement or inhibition of infectivity.

Results of both studies will be presented on the day of the conference.

Scientific Session 3: 09:00-10:35

Chair: Dr Tom McNeilly

IS 2: Designing new vaccines for disease control

Dr Bryan Charleston

Pirbright Institute, Ash Rd, Pirbright, Woking GU24 0NF

The Pirbright Institute has a long track record in vaccine development, many decades ago suspension cultures of baby hamster kidney cells were used for the first time to grow foot-and-mouth disease virus (FMDV) before inactivation and formulation into vaccines. This suspension culture system is still in use today for FMDV and other vaccine antigens. More recently, our capacity to interrogate pathogens in the natural host has put us at the forefront of the newly emerging field of structural vaccinology.

My own research programme, in collaboration with Prof. Dave Stuart at Oxford and Prof. Ian Jones at Reading, has resulted in the production of novel empty capsid vaccines for FMDV. These new vaccines don't require the production of large quantities of live virus and can be physically stabilised by modifying specific residues in the capsid. These capsid vaccines protect cattle from live virus challenge.

Similarly, working in collaboration with Dr. Peter Kwong from NIH, USA, Pirbright scientists have shown recombinant bovine respiratory syncytial virus F protein, locked in its pre-fusion state, confers protection from live virus challenge in cattle. These two studies support the concept of precise structural design for the development of livestock and human vaccines.

O9: Modern monkeys – understanding human-monkey interaction at an urban ecotourism site.

S. Paramasivam ^{1,2}, and R.J. Lye ¹

University of Surrey¹, Department of Health and Medical Sciences, School of Veterinary Medicine and Science ²The Animal Neighbours Project, School of Veterinary Medicine and Science, University of Surrey.

Conflict between humans and non-human primates has been an ever increasing topic of interest as the continued deforestation has led to the two living alongside each other. In Kuala Selangor, Malaysia, Silvered leaf monkeys (*Trachypithecus cristatus*) and Long-tailed macaques (*Macaca fascicularis*) have been labelled as pests due to their behaviours in and around the urbanised areas of the district. The behaviours that have landed them with this label include stealing, raiding bins and aggressive contact with humans, such as biting. Current mitigation strategies in the area have been unsuccessful in reducing the level of conflict and have included the mass culling of a portion of the macaque population. The aim of this paper is to recognise the relationship between human presence and non-human primate behaviour and to understand the relationship of non-human primate behaviour based on human directed behaviour at an urban ecotourism site. Data showed significant correlation between human directed behaviour that was either curious, fear or aggression and monkey response. Our finding also showed that human presence had an impact on the intergroup behaviour activity budget. Mitigation strategies that are implemented must take into consideration data such as this so that strategies are feasible and appropriate.

O10: Behavioural effects of post-partum pain relief in calves born with and without assistance.

Nicola Gladden¹, Lorenzo Viora¹, Dorothy McKeegan², and Kathryn Ellis¹

¹ Scottish Centre for Production Animal Health and Food Safety, University of Glasgow School of Veterinary Medicine ². Institute of Biodiversity, Animal Health and Comparative Medicine, University of Glasgow

Dystocia is a challenging event for both the cow and the calf; however, there is a paucity of research in this area, and it is not known if the use of analgesia at the time of calving can improve welfare for cows or calves. This study investigated the welfare impact of administration of a single dose of a non-steroidal anti-inflammatory drug (NSAID) in calves shortly after birth. Calves born on a commercial dairy farm were assigned to either an assisted calving group or an unassisted calving group as determined by the farmer using an established calving assistance scoring system. Calves within each of these two groups were randomly allocated to either a placebo group or a treatment group in a 2x2 randomised control trial. Closed circuit television (CCTV) cameras were set up in the calf accommodation and calves were continuously filmed for 48 hours postpartum. Video footage was analysed using scan sampling (every 5 minutes in alternate hours) to construct time budgets using an ethogram including lying behaviours (incorporating various lying positions), active behaviours and secondary behaviours such as social behaviours and feeding behaviours. Observations were split into four time blocks (0-12 hours, 12-24 hours, 24-36 hours and 36-48 hours postpartum). Preliminary data analysis indicates that there were significant behavioural differences between treatment groups relating to lying and play behaviour. The direction of the differences observed is suggestive of improved calf welfare in individuals receiving analgesia shortly after the time of birth.

O11: Improved diagnosis of Canine Infectious Respiratory Disease in dogs.

Ulrike Mauchle¹, Simon Priestnall¹, Judy Mitchell¹, and Jackie Cardwell¹

¹Department of Pathobiology and Population Sciences, The Royal Veterinary College

Canine infectious respiratory disease (CIRD) is a disease complex in dogs frequently encountered in practice and usually occurs in areas of high population density such as rehoming shelters. Aetiological agents traditionally associated with CIRD include canine parainfluenza virus (CPIV), canine adenovirus type 2 (CAV-2) and Bordetella bronchiseptica. Recently a number of novel and emerging pathogens have been associated with this disease complex; including canine respiratory coronavirus (CRCoV), canine pneumovirus (CnPnV), canine influenza virus (CIV), canine herpesvirus 1 (CHV-1), Mycoplasma cynos and Streptococcus zooepidemicus. These pathogens can be detected in clinical samples by means of molecular techniques, and a number of simplex conventional, as well as real-time PCR assays are available for the detection of individual agents. However, with the wide range of pathogens involved, our aim is to develop a diagnostic assay that is rapid, cost effective, sensitive, and specific, with the ability to detect multiple agents in one reaction.

A number of different multiplex assay platforms were compared on the basis of efficiency, long term cost effectiveness and technological advancement. We selected a genetic analysis system founded on capillary electrophoresis technology as the most suitable platform for the development of our multiplex assay. Our approach to assay development and primer design is discussed and initial results are considered. Future work includes validation of our assay on

clinical samples and if successful, we hope to enable improved respiratory pathogen surveillance in dogs within the herd health context of shelter medicine.

O12: Sensitivity of IB-RS-2 cells: does persistent infection with classical swine fever virus impact upon foot-and-mouth disease virus serological responses?

Jamaliah Senawi, Donald P. King, Anna B. Ludi, and Katarzyna Bachanek-Bankowska

Pirbright Institute, Ash Rd, Pirbright, Woking GU24 0NF

Foot-and-mouth disease (FMD) is an economically important disease that threatens international trade of livestock and livestock products. Virus neutralization test (VNT) is the accepted “gold standard” method used to define serological responses to vaccines and infection. However, IB-RS-2 cells that are routinely used are persistently infected with classical swine fever virus (CSFV), which restricts their use to high-containment laboratories. This study evaluated IB-RS-2s at different stages of their growth cycle, and also compared the performance of cells that did not contain CSFV. For ten cell cultures with different passage histories, confluent CSFV positive IB-RS-2s supported FMDV replication of field isolates and vaccine strains to higher titres compared to non-confluent cells (7/10 and 8/10 cell cultures, respectively); however, confluent cells yielded lower neutralisation titres in six individual sera tested (although differences in titres (at 100TCID₅₀) were not significantly different [$p=0.13$]). The presence of CSFV was confirmed using real-time RT-PCR: data showed that confluent cells contained significantly ($p=0.005$) higher copies of CSFV genome compared to the non-confluent cells. However, no significant correlation was observed between the amount of CSFV and FMDV titres obtained with the respective cell cultures. Further evidence to indicate that CSFV does not influence FMDV replication was obtained using CSFV negative IB-RS-2s (from FLI, Germany), where equivalent titration-sensitivity to CSFV positive cells was observed for 4 FMDV isolates. These data reinforce the importance of standardizing the cell-cycle of cells used for VNT, and indicate that CSFV negative IB-RS-2s may provide an alternative to existing cell lines.

Scientific Session 4: 11:30-12:15

Chair: Dr Henny Martineau

O13: A qualitative risk assessment to support a review of the requirements for secondary cleansing and disinfection after a notifiable avian disease outbreak.

Verity Horigan, Paul Gale, and Louise Kelly

Animal and Plant Health Agency, Poultry Health and Welfare Group

After a Notifiable Avian Disease outbreak an essential part of Government control measures is the cleansing and disinfection (C&D) of the infected premises. In the United Kingdom (UK) this is a two-step process of preliminary and secondary C&D. Current UK interpretation of the European Commission Directive (2005/94/EC) requires that all complex equipment is dismantled prior to secondary C&D. A qualitative risk assessment was undertaken to assess any potential change in risk if the EC Directive was interpreted to permit secondary C&D to be undertaken without dismantling complex equipment. A generic risk pathway was used to estimate the probability of virus survival following depopulation of an infected poultry flock, throughout the preliminary and secondary C&D procedures, for different types of equipment within the poultry house and derive a probability of virus recrudescence in a sentinel poultry flock. Data was based on that collected from published and unpublished studies, and expert opinion. Worst-case assumptions were made when no other data were available.

The risk assessment concluded that provided secondary C&D is carried out with due diligence (i.e. carried out to a defined code of practice) the risk of recrudescence of infection is negligible both with and without dismantling complex equipment in all farm types considered. The risk assessment did, however, identify areas which could still contain virus after preliminary C&D has taken place and where particular attention should be focused during the secondary C&D procedure. Across all farm-types, these areas include drinking nipples, nest box liner, autonests, perches, slatted areas and enrichments.

O14: Prevalence of fluoroquinolone-resistant *Salmonella* spp. in bird faeces around the river Cam and the associated public health risks.

Joana Rodrigues, Christopher O'Kane, and Caray A Walker

Anglia Ruskin University, Department of Biomedical and Forensic Science, East Road, Cambridge, CB1 1PT.

Salmonellosis is a major veterinary and zoonotic disease, with ca. 15 laboratory reports per 100,000 people across England and Wales in 2015 (PHE, 2016). It is one of the most important causes of gastroenteritis worldwide. Various environmental sources responsible for *Salmonella* outbreaks have been identified such as livestock, wildlife, poultry, as well as natural waters. Like many rivers, the river Cam is extensively used for several forms of recreational activities, making it a central feature of the city of Cambridge. There is consistency in the overall body of evidence concerning effects from exposure to faecally polluted recreational water (WHO, 2003); the most frequent adverse health outcome being enteric disease. Moreover, the World Health Organisation has identified fluoroquinolone-resistant *Salmonella* as a high research priority (WHO, 2017). In light of this, the aim of this project was to investigate the prevalence of fluoroquinolone-resistant *Salmonella* in bird faeces around the river Cam and the potential associated public health risk. To do this, a range of selective and

non-selective media, biochemical and serological testing were used to identify the presence of Salmonella in 48 bird faecal samples. These were then exposed to different fluoroquinolones and their resistance was assessed. Preliminary findings were able to isolate Salmonella from a number of key locations around the river including a nature reserve, residential areas, children playgrounds and generally busy foot traffic routes. Antibiotic sensitivity testing using a disk diffusion method is underway. So far, complete resistance was observed against Nalidixic Acid, however strains were susceptible to Ciprofloxacin.

O15: A bovine alveolus model to replace cattle in the study of host-pathogen interactions in bovine tuberculosis.

Diane F. Lee¹, Graham R. Stewart¹, F. Javier Salguero Bodes¹, M. Vordermeier², and Mark A. Chambers^{1,2}.

¹ School of Veterinary Medicine, University of Surrey, Guildford, UK; ² Animal and Plant Health Agency, Addlestone, UK.

Bovine tuberculosis (BTB), a zoonosis with severe socio-economic consequences, costs the UK taxpayer over £100 million per year, requiring the cull of 28,000 cattle in 2015¹. Tackling BTB requires deeper insights into host-pathogen interactions, in order to achieve significant breakthroughs in disease control and vaccine development.

This NC3Rs project aims to develop an in vitro tissue culture model, integrating a bilayer of bovine type II alveolar epithelial cells (AEII) and bovine pulmonary arterial endothelial cells (BPAECs). The model recreates the fundamental elements of the bovine pulmonary alveolus and provides a physiologically relevant model with which to study early events of the interaction of Mycobacterium bovis with the bovine lung. This model will be used to address the hypothesis that a significant aspect of vaccine-mediated protection against BTB is expressed at the level of host-pathogen interactions within the alveolus.

AEII cell immortalisation, via lentiviral transduction of the proto-oncogene Bmi1 and the telomerase subunit hTERT, further refines the model by creating a novel cell line which retains physiological phenotype, genomic stability and differentiation capabilities. The over-expression of these two genes in combination has been shown to result in a cell line with long term phenotypic and genotypic stability².

We present here the optimisation of AEII isolation, their characterisation when grown under 2D and 3D conditions and the results of studies undertaken to optimise the growth conditions of a bilayer culture model using bovine pulmonary arterial endothelial cells (BPAECs) and primary AEII cells.

1. <https://www.gov.uk/government/news/tb-strategy-ahead-of-schedule-as-england-set-to-apply-for-officially-tb-free-status-for-half-the-country>

2. Fulcher, M. L., Gabriel, S.E., Olsen, J.C., Tatreau, J. R., Gentzsch, M., Livanos, E., Saavedra, M. T., Salmon, P. and Randell, S. H. Am J Physiol Lung Cell Mol Physiol 296: L82–L91 (2009).

Career Development Session: 12:30-13:30

How to write a scientific paper?

Vicki Adams

Editor: Veterinary Record Open

An interactive workshop starting about writing a scientific paper for publication in a peer reviewed journal. Potential participants can view a previous webinar here: <https://youtu.be/qPe0a0qRBpQ>

An interactive workshop that will start with a short 10 minute talk about writing a scientific paper for publication in a peer reviewed journal with a few good and bad examples of common pitfalls.

Attendees will be encouraged to work in small groups to discuss approaches to writing a scientific paper on the basis of the IMRaD approach.

- introduction and discussion
- methods and results
- presentation of data
- responding to reviewers

Alternatively groups may rotate through each topic. Attendees are particularly encouraged to bring drafts of papers that they are currently working on or about to work regardless of the stage of completion.

Poster Abstracts

P1: A case report: Feline as an intermediate host for Penstastomids

Sharmini Julita Paramasivam^{1,2}, Mak Joon Wah³, and Wong Siew Tung³

¹University of Surrey, Department of Health and Medical Sciences, School of Veterinary Medicine and Science ²The Animal Neighbours Project, School of Veterinary Medicine and Science, University of Surrey. ³ Institute for Research, Development and Innovation (IRDI), International Medical University.

Interspecies interaction is a common occurrence, however, on islands the occurrence of wild animal and domesticated animals interaction can be more prominent due to a spatial influence. On the Tioman island located in the east coastal region of the Peninsula Malaysia, monitor lizards (*Varanus spp*) and domesticated free roaming cats (*Felis catus*) share similar spatial ground. During a routine field neutering of free roaming domesticated cats and feral cats at a tourist resort, small cyst like parasites were found in the abdominal fat of some cats. Scanning electron microscopy identified these to be Penstastomida nymphs. There were no pathological significance in the animals found to be carrying these nymphs and all cats were in good body condition. Cats have been reported to be final host for Penstastomida, where the parasite lodges itself into the upper respiratory tract however, there has not been evidence of cats being intermediate host. Pentastomiasis or human parasitism has been reported with humans being the final host. As the island is a popular tourist location, there is an important need to understand the cross species transmission and effect of this parasite taking into account the possible zoonotic potential.

P2: A Systematic Literature Review and Meta-Analysis into the Accuracy and Efficacy of Fat Measurement Techniques in Different Species.

Anne-Marie Macfarlane

University of Surrey

Obesity is a major problem in companion animals and humans, causing serious health issues. Obesity is amongst the three largest socio-economic burdens on humans worldwide. There is a strong correlation between human and animal obesity. Lack of owner recognition of companion animal obesity is a significant cause of the growing obesity epidemic. Obesity is rare in production animals, as financial profit is maximised by optimal body composition. Laboratory fat measurement techniques, carcass analysis, deuterium oxide isotope dilution (D₂O) and dual energy X-ray absorptiometry (DXA), and clinical techniques, real-time ultrasound (RTU) and body condition scoring (BCS) exist to quantify fat in animals. The reason for low obesity incidence in production animals is that clinical fat measurement techniques are utilised to monitor body composition. BCS and RTU are not commonly used in companion animal practice, reducing obesity recognition. There may be misconceptions by vets that fat measurement techniques are not validated, which may be why they are not utilised in companion animals. The project aims were to identify validation of fat measurement techniques across species and to pool these findings by Meta-Analyses. D₂O, DXA, BCS and RTU were identified as well validated in a range of species. The meta-analyses found strong correlations between studies validating BCS and RTU in production and companion animals. This project has identified that accurate and validated fat measurement techniques exist but are underutilised in companion animals. BCS and RTU should be used routinely, increasing owner recognition and allowing measures to be taken to reduce obesity incidence.

P3: Antimicrobial effects of thymol on conjugation in E. coli

Fatemah Alkandari and Martin J. Woodward,

The University of Reading, Reading, UK

Plant essential oils are naturally occurring food preservatives that not only protect against food spoilage but also due to their broad spectrum antimicrobial activity protect against food borne pathogens: furthermore, they are generally-recognized as safe [GRAS]. Thymol is a compound found in thyme essential oil that was shown to inhibit the growth of *Escherichia coli*, but the mechanisms of thymol inhibition are unknown.

Objective

This study aims to assess the antibacterial activity of thymol on the growth of *E. coli* and to assess its potential use at sub-lethal concentrations to control conjugal transfer between *E. coli* strains.

Results

Minimum inhibitory concentrations (MICs) and minimum bactericidal concentrations (MBCs) of thymol were determined using broth microdilution method. *E. coli* strains used were isolated from poultry. The growth of *E. coli* in thymol was significantly lowered in a concentration dependent manner. Thymol MIC was used to assess its effect on plasmid transfer between *E. coli* strains. Results show the efficiency of conjugation was decreased when treated with thymol at 50 µg/ml (1.93×10^{-5} cfu) and 100 µg/ml (0.00741×10^{-5} cfu), while untreated control was (3.39×10^{-5} cfu).

Conclusions

Thymol has desired antimicrobial effects on *E. coli*. The antibacterial effect was attributed to Thymol's ability to educe plasmid transfer between strains which can limit the spread of antibiotic resistance among bacteria.

P4: Effect of condensed tannins as antimicrobial agents against pathogenic bacteria in poultry

Mohammed M. Dakheel¹, Fatemah A. H. Alkandari², Martin J. Woodward², Irene Mueller-Harvey¹ Christopher Drake¹ and Caroline Rymer¹

¹ School of Agriculture, Policy and Development, University of Reading. ² School of Chemistry, Food and Pharmacy, University of Reading.

Plants contain an abundance of natural substances that hold promise as feed additives. Tannins are an important group of these plant compounds. Tannins can link with proteins and other components to make complexes that, depending upon their chemical nature, alter their activities. Recently, condensed tannins have been illustrated to be toxic against several pathogenic organisms, such as gastrointestinal parasites. The aim of this study was to investigate the effect of tannin compositions on antimicrobial activity against Gram-negative and Gram-positive bacteria. Tannin structures ranged from procyanidins to prodelphinidins and also included mixed tannins (procyanidin/prodelphinidin mixtures) and the mean degree of polymerisation (i.e. average tannin size) of these tannins ranged from dimers to decamers. The minimum inhibitory concentrations (MIC) of these tannin extracts were determined against two pathogenic models, Gram-negative (avian pathogenic *Escherichia coli*, APEC) and Gram-positive (*Staphylococcus epidermidis*), by using the agar diffusion and broth microdilution

methods. Stepwise linear regression showed that the MIC for E Coli (which ranged from 5.0 to 10.0 mg/ml) was negatively related to mDP and positively related to PC% (MIC=7.83-0.591 mDP+0.0468 PC, R²=0.781, P=0.005) while for *S. epidermidis* (range 1.25 to 5.00 mg/ml) the relationship was: MIC=2.720-0.3100 mDP+0.03822 PC (R²=0.848, P=0.001). These results show that PD has greater antimicrobial activity than PC, and that Gram positive bacteria may be more susceptible to tannins than Gram negative bacteria, perhaps because of the structure of their cell membranes. Higher mDP values were also important in reducing the MIC.

P5: Influenza A virus detection in environmental samples: experimental and field derived materials, H7N9 and H7N7

Caroline J. Warren, Marek J. Slomka, Scott M. Reid, Anita S Puranik, Eric Agyeman-Dua, Mike D. Kelly, Ian H. Brown, and Sharon M. Brookes

Animal and Plant Health Agency (APHA) Virology Department, New Haw, Surrey KT15 3NB, UK

Experimental environmental samples of drinking water, feathers and faeces collected from turkeys challenged with LPAIV H7N9 A/Anhui/1/2013 were tested for detection of viral RNA by RRT-PCR and virus survival (recovery) using tissue culture. Litter, feather and duck faeces samples taken from field samples at an HPAIV H7N7 A/chicken/England/26352/2015 index site, before disinfection, were also tested by RRT-PCR to determine viral RNA load.

Drinking water and faeces samples from H7N9 challenged turkeys showed positive PCR results at day 1 to 10, and viral RNA from feathers collected at day 3 to 9. In tissue culture experiments, we found H7N9 D30 (time taken for virus titre to reduce by 1 log₁₀ at 30°C) was 7.8 days. We also modelled virus survival on poultry house building materials and quantified viral infectivity at 21°C (D21); H7N9 survived for hours on plastic and metal, but minutes on wood.

We detected abundant H7N7 viral RNA in litter and feather samples taken from the index site, e.g. outbreak feather samples had up to 1.7 x 10⁵ REU (relative equivalent units) to infectious load. Neither duck feathers nor faeces collected from the pond close to this site showed detectable viral RNA.

Detection and environmental survival data for influenza A viruses supports statutory epidemiological investigations, indicates possible routes of virus introduction onto farms, transmission through poultry sheds and could help towards reducing the high cost and animal welfare burdens caused by AIV incursion to the poultry industry and UK plc (poultry commodities and international trade).

P6: Prevalence of zoonotic bacterial pathogens in dog faeces collected from recreational areas in Cambridge.

Hollie Allison and Caray A Walker

Anglia Ruskin University, Department of Biomedical and Forensic Science, East Road, Cambridge, CB1 1PT.

The overlap in recreational areas between humans and dogs provides ample opportunity for the spread of zoonotic gastrointestinal bacteria. This study aims to identify the prevalence of *Yersinia sp.*, *Campylobacter sp.*, *Salmonella sp.* and *Escherichia coli* in freshly voided dog faeces collected from parks within Cambridge. The potential for the spread of disease from

dog fouling is an important public health issue. Recent studies have demonstrated dogs fed a raw meat diet have increased gastrointestinal microflora (Sandri et al., 2016). Additionally, antibiotic resistant strains of zoonotic bacteria in dog faeces, which could provide a reservoir of antibiotic resistant genes capable of being passed onto their naïve hosts, have been identified (Wedley et al., 2017). Bacteria were cultured on a range of selective agar plates and incubated under aerobic and anaerobic conditions, biochemical techniques were then used to identify bacteria. Followed up by 16s rRNA PCR to confirm identification. We then investigated the antibiotic resistant profiles of the isolates using a disk diffusion assay with a range of common antibiotics. Overall the prevalence of *E. coli* isolates was most frequent, followed by *Campylobacter sp.* and *Salmonella sp.* *Yersinia sp* isolates were least commonly identified. Antibiotic resistant testing of the isolates is currently underway. The data obtained from this study provides important information on how antibiotic resistance could spread via zoonotic pathogens. In conclusion, potentially pathogenic bacteria have successfully been isolated from dog faeces collected from key locations within Cambridge. Preliminary data has shown that some of these isolates are resistant to commonly used antibiotics.

References:

- Sandri, M., Dal Monego, S., Conte, G., Sgorlon, S. and Stefanon, B. (2016). Raw meat based diet influences faecal microbiome and end products of fermentation in healthy dogs. *BMC Veterinary Research*, 13(1).
- Wedley, A., Dawson, S., Maddox, T., Coyne, K., Pinchbeck, G., Clegg, P., Nuttall, T., Kirchner, M. and Williams, N. (2017). Carriage of antimicrobial resistant *Escherichia coli* in dogs: Prevalence, associated risk factors and molecular characteristics. *Veterinary Microbiology*, 199, pp.23-30.

P7: Stereological Analysis of the Number of Osteocytes in Bone Defects Performed on Wistar Ovariectomized Rats Using the Poly (Vinylidene-Trifluoroethylene) / Barium Titanate Membrane

Priscilla Hakime Scalize; Karina Fittipaldi Bombonato Prado, Luiz Gustavo de Souza, Adalberto Luiz Rosa, Márcio Mateus Beloti, Marisa Semprini, Rossano Gimenes, Adriana Luisa Gonçalves de Almeida, Fabíola Singaretti de Oliveira, Milla Sprone Tavares, Roger Rodrigo Fernandes, Sebastião Carlos Bianco, Simone Cecílio Hallak Regalo, Antonio Augusto Coppi, and Selma Siessere

University of São Paulo, Faculty of Dentistry of Ribeirão Preto, University of Surrey – Veterinary, CAPES Development Agency - Brazil

Osteoporosis is considered a disease in which it leads to a fragility of the bone microstructure leading to future fractures, in which there is a greater activity of osteoclastic cells that reabsorb bone structures, than osteoblastic cells that deposit bone matrix, and may lead to future fractures. Osteoporosis occurs due to several factors, such as aging; menopause; Lack of physical exercise; Some medicines; Unbalanced diet with lack of calcium and vitamins; Excess of alcohol, coffee and cigarettes. The objective of this research is to analyze the behavior of osteocytes in relation to P (VDF-TrFE) / BT and PTFE membranes. Thirty Wistar rats of approximately 300g were used, in which the Ethics Committee of Brazil approved by protocol 2014.1.157.58.4, which were ovariectomized. After 150 days, bone defects were performed in their calvaria with a diameter of 5mm, and were distributed in four groups: 1 - P membrane (VDF-TrFE) / BT; PTFE membrane; 3- no type of membrane and 4- Sham. After 4 weeks the animals were sacrificed and their defects were analyzed by micro-CT and stereological analysis of the osteocyte count on histological slides. The statistics will be according to the distribution of the samples. It is expected from this research that the animals that have the membranes have a greater amount of osteocytes by having a larger amount of

bone tissue neofomed with the help of the membranes besides analyzing the differences between them.

P8: Development of real-time RT-PCR assays for specific detection of 2016 highly pathogenic avian influenza viruses of subtypes N8 and N5

Christine Russell, Scott M. Reid, Jayne L. Cooper, Eric Agyeman-Dua, Helen E. Everett, Steve Essen, Marek J. Slomka, Ian H. Brown, and Sharon M. Brookes

Department of Virology, Animal and Plant Health Agency-Weybridge, New Haw, Addlestone, Surrey, KT15 3NB, United Kingdom

Introduction: Since October 2016 until July 2017, widespread detections of H5N8 highly pathogenic avian influenza viruses (HPAIVs) (clade-2.3.4.4) have occurred in wild birds and poultry in 23 European countries (including the UK). A minority of this clade has also included H5N5 reassortants. Sensitive and specific H5-subtype haemagglutinin (HA) gene detection was successful using a previously validated H5-specific real-time reverse transcription polymerase chain reaction (RRT-PCR) assay, but neuraminidase (NA) subtype-specific detection necessitated two new RRT-PCR assays for N8- and N5- genes. Results: UK H5N8 HPAIV outbreaks were investigated by using a modification of the Hoffman (2016) N8 RRT-PCR with oligonucleotide sequences adjusted to optimize detection of contemporary H5N8 HPAIVs. The N8 RRT-PCR did not cross-detect other NA subtypes. Examples will show the testing of swabs collected from infected poultry premises, demonstrating the concordance and sensitivity of the subtype-specific H5 and N8 RRT-PCRs, together with the M-gene RRT-PCR which served to detect all AIV subtypes. Although no H5N5 HPAIV incursions have occurred to date in the UK, an N5 RRT-PCR was designed by similar modification of the previously described N5 RRT-PCR (Hoffman et al 2016). The N5 RRT-PCR was assessed using clinical specimens from H5N5 HPAIV experimentally-infected chickens which affirmed its sensitivity. Specificity testing detected no other NA type. Discussion & Conclusions: The N8 RRT-PCR provided a valuable diagnostic tool to confirm subtype H5N8 HPAIV incursions in 13 infected UK poultry premises, and H5N8 HPAIV-infected wild birds. The N5 RRT-PCR was prepared as a contingency for any H5N5 HPAIV incursions in the UK.

P9: Investigating the effect of an antimicrobial growth promoter on immune gene expression and performance in pedigree broilers.

Lindsay Fulton, Richard Bailey, Mark Stevens, Nick Sparks, Emily Gilmour, and Spiridoula Athanasiadou

Scotland's Rural College, Aviagen, University of Edinburgh

Antimicrobial growth promoters (AGPs) are antibiotics that have been used routinely since the 1950s to improve growth and health in broilers. It is thought that their action is mediated via modification of bacterial communities in the gut. Following their EU-wide ban, elucidating how changes in the microbiota and gut physiology underpin the action of AGPs has been an active area of research across the poultry industry, as non-antibiotic alternatives to AGPs are sought.

In a broiler study we aimed to associate the effects of a commonly used AGP, tylosin, with performance and microbiota in male and female broilers. Treatment groups (n = 20) were as follows: 1) Male + tylosin (40 mg/kg feed), 2) male control, 3) female + tylosin, 4) female

control. Pen weight and feed intake was measured throughout the trial. At day 23 and 37, one bird per pen was euthanised and tissue samples taken from caecal tonsils.

Supplementation with tylosin was found to significantly increase final body weight ($P < 0.001$) and lower FCR ($P < 0.001$). IL-6 expression in the caecal tonsil was measured by qPCR. On day 23, this was significantly lower ($P < 0.05$) in the AGP treated males, but this was not observed in females. The results demonstrate the effect of tylosin on growth and the gene expression results suggest that IL-6 may play a role in this. This finding may help to understand the action of AGPs and provide a target for developing novel therapeutics. Ongoing work will use next-generation sequencing to describe the effect of AGPs on the microbiota and correlate these changes with performance and health.

P10: Histological categorisation of equine ovarian follicles from healthy and diseased mares.

Abdulqader AL Ibrahim^a, Su Wei Tay^a, Patrick Pollock^b, Timothy Parkin^a, Monika Mihm Carmichael^a

^a School of Veterinary Medicine, University of Glasgow, UK; ^b School of Veterinary Medicine, University of Edinburgh, UK

Objectives:

- Categorisation of equine follicles in different stages (healthy/diseased) through evaluation of antral follicle wall H&E sections

Results:

- 4 broad categories were established; Very Healthy (VH), Healthy (H), Early Atresia (EA) and Late Atresia (LA)

Significance of results:

- In equine follicles, the onset of atresia can be determined using histomorphological changes in relative proportions of different cell types present
- Seasonal and disease status may affect follicle health categorisation
- Chronic mild or severe disease does not result in atresia of large antral follicles