College of Veterinary Medicine
Kansas State University
presents

Phi Zeta Research Day

Φ

A.D. 1925

March 1, 2022

History of Phi Zeta

Phi Zeta was originated in 1925 by a group of senior veterinary students in the New York State Veterinary College at Cornell University. With the assistance of a group of faculty members, including the Dean of the College, Dr. Veranus A. Moore, the Society was formally organized, and Dean Moore was elected as the first president of the Alpha Chapter. The **Society of Phi Zeta** was organized in 1929 at a meeting in Detroit, Michigan, and Dean Moore became the first president of the Society.

Also in 1929, a charter was granted to the School of Veterinary Medicine at the University of Pennsylvania, and the Beta Chapter was established. In 1931, the Executive Committee approved the petition of a group from Iowa State College, and the Gamma Chapter was established. Since then twenty-four chapters have been chartered, brining the total number of chapters to twenty-seven. Chapters of the Society may be formed at any recognized veterinary medial college or at any other institution of higher learning.

From its beginning, it has been the aim of Phi Zeta to stand for constant advancement of the veterinary profession, for higher educational requirements, and for high scholarship. As stated in the Constitution, the **Object of the Society** shall be to **recognize and promote scholarship and research in matters pertaining to the welfare and diseases of animals.**

Selection of Membership

Membership in the Society consists of two classifications, Active and Honorary. Those eligible to election as **Active Members** are:

A.   Any candidate for the DVM/VMD degree in a veterinary medical college where a chapter exists, and who has completed at least two years of the professional curriculum, and who meets the following requirements:

   1.   The candidate must have an acceptable personality, be of good moral character, and possess high ideals regarding professional service conduct.

   2.   When elected in the junior or third year, students must rank scholastically in the highest 10% of their veterinary medical class.

   3.   When elected in the senior or fourth year, students must rank scholastically in the highest 25% of their veterinary medical class.

B.   Any veterinarian who has been in possession of a veterinary medical degree for at least two years, and who has displayed ability of high order in dealing with one or more phases of the science of veterinary medicine, and who meets one of the following criteria.

1. The candidate is enrolled as a graduate student in a college of veterinary medicine and has completed at least twenty semester (thirty quarter) hours of graduate credit or has successfully passed preliminary examinations.

2. The candidate has been engaged in an intern or residency program for at least two years or has become board certified in his/her specialty.

3. The candidate has completed two years or more on the faculty of the institution or scientific staff of a scientific institution within commuting distance of the nearest chapter of Phi Zeta and has been involved in veterinary research or service.

Those eligible to election as **Honorary Members** are:

A. Distinguished veterinarians in possession of their veterinary medical degrees for at least five years and who have rendered notable service to their profession.

B. Persons not in possession of the veterinary medical degree, who have rendered distinguished service in the advancement of the science relating to the animal industry and particularly of animal diseases.

C. Only in exceptional instances shall more than two honorary members be elected by any one chapter in any one academic year.

Active members who move from the residence of their chapter may: **1** become known as **inactive members** and not subject to the payment of dues; or **2 transfer** their membership to another chapter.

Name and Symbols of the Society

The organizers of the Society, when seeking a suitable name, sought the help of a learned Greek scholar, **Professor George P. Bristol** of Cornell University. Professor Bristol suggested a Greek word, which in the Latin form is spelled **PHILOZOI** and means "love for animals." The abbreviation of Phi Zeta was adopted as the name of the society. The emblem consists of a pendant formed by the letter Phi superimposed by the letter Zeta. The design was the work of **Louis Agassiz Fuertes**, the great naturalist and artist.

The **Executive Committee**, consisting of the president, president-elect, secretary-treasurer, and the three most past-presidents, oversees and promotes the objectives of Phi Zeta through activities of the various chapters. **Meetings** of the Society of Phi Zeta are held annually in conjunction with the AVMA Convention. All members of the Society are invited to attend these meetings.

Each year the Society sponsors two **Research Awards** and helps fund lectures at various Chapters. Chapters recognize and promote high scholarship and research through an annual initiation ceremony, by sponsoring research days, and by inviting outstanding lecturers to speak on topics relevant to veterinary medicine and the welfare of animals.

Chapters of Phi Zeta

This year's invited keynote speaker is Dr. Sara Thomasy.

Dr. Sara Thomasy is a Professor in the Department of Surgical and Radiological Sciences in the School of Veterinary Medicine at the University of California, Davis. She received her B.S. in Biology from The Ohio State University in 2000 and her DVM from UC Davis in 2005. She then completed a PhD in pharmacology and toxicology from UC Davis in 2006. Following a 1-year small animal rotating internship at North Carolina State University, she completed a comparative ophthalmology residency at UC Davis in 2010.

Dr. Thomasy is a Diplomate of the American College of Veterinary Ophthalmology and serves as a reviewer for several journals including Investigative Ophthalmology and Vision Science and Veterinary Ophthalmology. She is a core scientist at the California National Primate Research Center and co-runs a large, interdisciplinary vision science laboratory with Drs. Christopher Murphy and Paul Russell. Her research interests include large animal models for anterior segment disease and corneal wound healing.

For more information, please visit:
https://integrativepath.vetmed.ucdavis.edu/people/sara-thomasy
https://mrtvisionsciences.com/sthomasy/

The title of her presentation is: ***"Novel treatments for corneal endothelial disease"***

Annual Phi Zeta Research Day
March 1, 2022
The Sigma Chapter of Phi Zeta, est. 1969

Schedule of Events

12:00 (noon)	***PLENARY Session[1]***
BI Auditorium	**Welcome by Phi Zeta President**, **Dr. Jessica Meekins** **Introduction of Keynote Speaker by Phi Zeta Vice President, Iulia Osipova** ***Keynote Speaker* Dr. Sara Thomasy**, Professor, Department of Surgical and Radiological Sciences, School of Veterinary Medicine, University of California, Davis (via Zoom) ***"Novel treatments for corneal endothelial disease"*** Via Zoom – Session ID: 990 6551 8078 / Passcode: 841533
1:15 – 2:30 pm	***ORAL Research Presentations[2]***
BI Auditorium	**Applied/Clinical Science Research (Small animals/exotics)**
201 Trotter Hall	**Applied/Clinical Science Research (Large animals/exotics)**
301 Trotter Hall	**Basic Science Research & Case Reports (Large animal)**
2:30 – 3:30 pm	***Royal Canin POSTER Session***
BI Atrium	**Basic Science Research / Applied/Clinical Science Research / Case Reports**
3:30 – 4:30 pm	***ORAL Research Presentations[2]***
BI Auditorium	**Applied/Clinical Science Research (Small animals/exotics)**
201 Trotter Hall	**Applied/Clinical Science Research (Large animals/exotics)**
301 Trotter Hall	**Basic Science Research & Case Reports (Large animal)**
5:30 pm	***AWARDS Ceremony[3]***
BI Auditorium	**Initiation of New Members to Phi Zeta** **Announcement and Presentation of Awards Recognizing Research and Scholarship Accomplishments** **Closing Comments**

[1] The plenary session (welcome and keynote) will be held in the BI Auditorium – Box lunches available by RSVP

[2] Presenters should arrive no later than 1:00 pm to their designated room to upload their presentations. Presentations should be 12-minutes and allow 3 minutes for questions and answers.

[3] We invite all attendees to RSVP join us for the Award ceremony at the BI auditorium. The auditorium will be open starting at 4:45.

Applied/Clinical Science ORAL PRESENTATIONS
Phi Zeta Research Day
March 1, 2022, 1:15 – 4:30 pm
BI Auditorium

1:15 – 1:30	Freilich, Leah	Feline GLP-2 plasma concentrations pre- and post-prandially after ingestion of meals high in fat, carbohydrate, or protein
1:30 – 1:45	Gray, Mackenzie	Improving the clinical efficacy of butorphanol for analgesia in dogs
1:45 – 2:00	Hiebert, Kara	Anesthetic effects of alfaxalone-ketamine-midazolam and alfaxalone-ketamine-dexmedetomidine administered intramuscularly in black-tailed prairie dogs (*Cynomys ludovicianus*)
2:00 – 2:15	Komp, Marissa	Role of palliative radiotherapy in terminal decision making in dogs with advanced cancer
2:15 – 2:30	Lai, Poyu (Tony)	Elective ovariohysterectomy or castration can proceed in shelter dogs despite mild to moderate presurgical leukocytosis
2:30 – 3:30	**Break for Poster Session**[1]	
3:30 – 3:45	Madesh, Swetha	Serological and molecular detection of *Anaplasma* and *Ehrlichia* species in dogs from Paraguay
3:45 – 4:00	Ryon, Lauren	Urinary obstruction in a dog secondary to os penis (baculum) hemorrhage
4:00 – 4:15	Thompson-Butler, D. Angela	Renal and cardiac effects of diltiazem continuous infusion in healthy dogs
4:15 – 4:30	Ullom-Minnich, Rebecca	Evaluation of hematologic and serum iron parameters following intravenous iron sucrose administration and serial venipuncture in healthy cats

[1] Poster presentations will be held at the **Atrium of the BI Auditorium**

Applied/Clinical Science ORAL PRESENTATIONS
Phi Zeta Research Day
March 1, 2022, 1:15 – 4:30 pm
201 Trotter Hall

1:15 – 1:30	Lovett, Anne	Acute anaplasmosis reduces breeding soundness in experimentally infected beef bulls
1:30 – 1:45	Fritz, Bailey R.	Determination of milk concentrations and pharmacokinetics of salicylic acid following acetylsalicylic acid (aspirin) administration in postpartum dairy cows
1:45 – 2:00	Weeder, Mikaela	Optimal lameness induction model using amphotericin B in meat goats
2:00 – 2:15	Heinen, Lilli	Evaluation of predictive models to determine total morbidity outcome of feedlot cattle based on pen-level feed delivery data during the first 15 days on feed
2:15-2:30	Hall, Madeline	Developing a facial grimace scale to assess pain in goats
2:30 – 3:30	**Break for Poster Session[1]**	
3:30-3:45	Horton, Lucas	An evaluation of metaphylaxis for bovine respiratory disease in medium-risk feedlot calves and outcomes impacting antimicrobial use
3:45 – 4:00	Kalam, Ramya	Prevalence and antimicrobial susceptibilities of pathogenic *Escherichia coli* involved in swine colibacillosis in piglets fed diets supplemented with *in-feed* and or *in-water* chlortetracycline
4:00 – 4:15	Kumar, Deepak	Antibody response to Rotavirus A and C in gilts after Natural Planned Exposure and their piglets
4:15 – 4:30	Schelkopf, Conrad	Comparison of three diagnostic tools for detection of ketosis in early lactation dairy cows

[1] Poster presentations will be held at the **Atrium of the BI Auditorium**

Basic Science ORAL PRESENTATIONS
Phi Zeta Research Day
March 1, 2022, 1:15 – 4:30 pm
301 Trotter Hall

1:15 – 1:30	Neyland, Trey	360-degree uterine torsion with bilateral hydroureters in a 4-year-old Hembra alpaca
1:30 – 1:45	McHaney, Anastasia	Goose egg on a goat head: imaging characteristics of a congenital vascular anomaly
1:45 – 2:00	Cool, Konner	SARS-CoV-2 infection and transmission in adult white-tailed deer
2:00 – 2:15	Ferm, Jonathan	Targeted mutagenesis in *Anaplasma phagocytophilum* for modified live vaccine development
2:15 – 2:30	Genda, Dominica	RNA analysis of 7-genes spanning from ECH_0659 to ECH_0665 encoding for several phage-related proteins in *Ehrlichia* and *Anaplasma* species
2:30 – 3:30	**Break for Poster Session[1]**	
3:30 – 3:45	Kwon, Taeyong	Ancestral lineage of SARS-CoV-2 is more stable than Alpha and Beta variants of concern in human biological fluids
3:45 – 4:00	McCall, Jayden	Identification of protective antigens from African Swine Fever Virus proteome
4:00 – 4:15	McCormick, Alyssa	Development of a 4-plex qPCR assay for the detection and quantification of species and subspecies of *Fusobacterium necrophorum* and *Fusobacterium varium* in bovine rumen fluid
4:15 – 4:30	Miller, Kamilyah R.	Detection of *Trypanosoma cruzi* in raccoons and triatomes in northeast Kansas

[1] Poster presentations will be held at the **Atrium of the BI Auditorium**

Basic Science Research POSTERS
Phi Zeta Research Day
March 1, 2022, 2:30 – 3:30
BI Atrium
(Posting from 1:00 – 4:30 pm; Q&A for Judging 2:30 – 3:30 pm)

1	Hull, Morgan	Anti-Bovine Serum Albumin IgG antibody production in horses post-vaccination
2	Jackson, Nathan	Role of estrogen in intestinal ischemia-reperfusion injury
3	Johnson, William	Comparison of Mini-FLOTAC and Modified McMaster techniques to enumerate gastrointestinal parasites in naturally infected North American bison herds
4	Madden, Daniel	Identification of cellular factors involved in African Swine Fever virus infection
5	McDowell, Chester	Assessment of SARS-CoV-2 strain competition in co-infected adult white-tailed deer
6	Quintana, Theresa	Capturing coronaviruses: comparison of recovery methods for infectious coronaviruses from environmental surfaces
7	Robben, Nicole	Effect of mosquito salivary proteins on human endothelial physiology
8	Tomlinson, Trey	Surveillance of *Borrelia burgdorferi* in white-footed mice (*Peromyscus leucopus*) in Pennsylvania
9	Weng, William	Experimental infection of ferrets with different SARS-CoV-2 lineages

Case Report/Case Studies POSTERS
Phi Zeta Research Day
March 1, 2022, 2:30 – 3:30 pm
BI Atrium
(Posting from 1:00 – 4:30 pm; Q&A for Judging 2:30 – 3:30 pm)

1	Chavez-Peon, Erica	Multifocal spinal inflammatory myofibroblastic tumors in a juvenile paraparetic dog
2	Bolda, Random	Identifying pathways of entry of ASF into sows farms and potential improvement in biosecurity to prevent viral entry
3	Toth, Darby	Association between hypercalcemia and iliosacral lymph node metastasis in dogs diagnosed with anal sac Adenocarcinoma

Applied/Clinical Science Research POSTERS
Phi Zeta Research Day
March 1, 2022, 2:30 – 3:30 pm
<u>BI Atrium</u>
(Posting from 1:00 – 4:30 pm; Q&A for Judging 2:30 – 3:30 pm)

1	Barber, Hannah	Search of acaricidal bacteria for the control of the lone star tick (*Amblyomma americanum)*
2	Barksdale, Allyson	Determining the stability of human coronavirus OC43 on different surfaces
3	Cassale, Nicole	Autologous biologic therapies for treatment of full thickness cutaneous wounds in horses
4	Meyers, Walter	Stance analysis and activity tracking in six dogs with spontaneous osteosarcoma undergoing palliative radiation therapy-preliminary study
5	Nelson, Joel	Effects of steroid implants and differing tall fescue endophyte (*Acremonium coenophialum*) levels on cattle
6	O'Day, Shannon	Protective efficacy of the conditionally licensed bovine anaplasmosis vaccine against homologous or heterologous strain challenge
7	Phillips, Morgan	Prevention of Swine Influenza A viral infection by water extract from *Euglena gracilis*
8	Rice, Samantha	Antimicrobial activities of cannabinoids against bacterial pathogens that cause liver abscesses in feedlot cattle
9	Salih, Harith	Evaluation of antimicrobial activities of phytophenols against liver abscess causing pathogens in feedlot cattle
10	Timmerman, Sarah	Using microwave ablation therapy on aldosterone-producing adenomas to eliminate hyperaldosteronism
11	White, Zachary	Sex differences in the relationship between exercise and the brain

ORAL PRESENTATIONS REQUIREMENTS:

- · Arrive no later than 1:00 pm to your designated room to upload your presentation.
- · No specific format required.
- · 12-minute presentation time limit; 3 minutes allowed for questions and answers.
- · Please give 24-48 hours advance notice if you are unable to attend/present due to unforeseen circumstances.

POSTER PRESENTATION REQUIREMENTS:

- · Poster Size: The supplied poster boards can accommodate posters 48 inches wide by 36 inches deep.
- · Poster PDFs need to be sent to Ms. Gail Eyestone (geyestone@vet.k-state.edu) by **February 21, 2022**.
- · Posters can be printed with the Veterinary Medical Library's Print Graphic Services. Contact Susie Larson at 785-532-4025 or larson@vet.k-state.edu. The cost of poster printing is the responsibility of the presenter or presenter's mentor.
- · The BI Atrium will be open from 9:00 am on the day for set-up.
- · Table tents and thumbtacks will be provided.
- · The Poster Session question and answer time for judging will be from **2:30-3:30 pm.**
- · Posters must be removed from the BI Atrium by **4:30 pm**
- · Please give 24-48 hours advance notice if you are unable to present due to unforeseen circumstances.

PHI ZETA OFFICERS 2022:

On behalf of the Phi Zeta Executive Committee (2022):

Dr. Jessica Meekins – President (jslack@vet.k-state.edu)
Iulia Osipova (2022) – Vice-President (iosipova@vet.k-state.edu)
Dr. Emily Reppert – President-Elect (erepper@vet.k-state.edu)
Dr. Sara Gardhouse – Secretary/Treasurer (sgardhous@vet.k-state.edu)
Gail Eyestone – Administrative Assistant (geyestone@vet.k-state.edu)

Presenter: Leah Freilich

Feline GLP-2 plasma concentrations pre- and post-prandially after ingestion of meals high in fat, carbohydrate, or protein

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Keywords: enteroendocrine hormones; nutrition; intestinal health; cat

Abstract

Introduction: Glucagon-like peptide-2 (GLP-2) is an enteroendocrine hormone secreted in response to meal ingestion, with some nutrients causing increased secretion compared to others. Based on other enteroendocrine responses in cats, it was hypothesized that maximal plasma GLP-2 concentrations would be measured 30 minutes after meal ingestion, and a high-fat meal would induce greater GLP-2 secretion than high-carbohydrate or -protein meals.

Methods: In a randomized, cross-over study, 9 healthy research cats were withheld food (15 hours) and then fed standardized high protein, carbohydrate, or fat meals. At baseline and 30, 60, 75, 90, and 120 minutes post-meal, plasma samples were collected and proteinase inhibitors were immediately added to half of the samples. Samples were analyzed using a commercial ELISA for feline GLP-2. The Friedman test (non-normal data) or one-way repeated measures ANOVA (normal data) was used to evaluate maximal GLP-2 secretion within each diet. GLP-2 concentrations among diets were compared using a mixed analysis of variance accounting for repeated measures.

Results: Plasma GLP-2 concentration 30 minutes post a high-fat meal (1.64 ± 0.23 ng/mL) was higher than 90 minutes (1.39 ± 0.31 ng/mL; P = 0.029) and 120 minutes (1.44 ± 0.27 ng/mL; P = 0.031) post-meal. There was no difference in GLP-2 concentration after the high-protein or high-carbohydrate meal when comparing any post-prandial time to baseline. There was no difference in post-prandial GLP-2 concentrations between the various meal types.

Conclusions: Fat is a small but significant stimulus for GLP-2 secretion following meal ingestion in cats.

Presenter: Mackenzie Gray

Improving the clinical efficacy of butorphanol for analgesia in dogs

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Keywords: Butorphanol; Small Animal (Canine); Analgesia

Abstract

Butorphanol is commonly used for short-term sedation and analgesia in dogs. It is widely available and cost-effective. It is a mixed opioid agonist/antagonist, decreasing administrative burden and abuse potential, but is limited by its short duration of effect. This study evaluated methods to enhance the clinical efficacy of butorphanol. Twelve healthy beagles were enrolled; six dogs were randomly allocated to each treatment. Butorphanol was administered as an IV bolus (0.4 mg/kg), IV loading dose (0.2 mg/kg) followed by IV CRI (0.2 mg/kg/hr for 8 hours), SC (0.4 mg/kg) and SC (0.8 mg/kg) mixed with an equal volume sodium bicarbonate producing a suspension due to precipitation (butorphanol-bicarbonate). We hypothesized the CRI would exhibit a longer duration of effect compared to the IV bolus and the butorphanol-bicarbonate would exhibit a longer duration compared to the butorphanol SC. Noninvasive centrally-mediated opioid effects were measured during a 24-hour period (rectal temperature and sedation). Rectal temperature was previously correlated with opioid analgesia in dogs. Blood samples were collected for future pharmacokinetic analysis. Rectal temperatures were significantly lower than baseline from 1.5-4 hours (IV), 1-5 hours (CRI) and 2-7 hours (butorphanol-bicarbonate). There was no significant effect on rectal temperature from SC butorphanol. Some sedation was observed in all treatments. These results suggest that IV, CRI and butorphanol-bicarbonate

produced opioid effects previously correlated with analgesia, but SC did not. Butorphanol-bicarbonate may be an easy and effective method for extending the duration of butorphanol in dogs. Further studies are required to determine reproducibility of these results.

Presenter: Kara Hiebert

Anesthetic effects of alfaxalone-ketamine-midazolam and alfaxalone-ketamine-dexmedetomidine administered intramuscularly in black-tailed prairie dogs (*Cynomys ludovicianus*)

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Keywords: Anesthesia; rodents; black-tailed prairie dogs; immobilization

Abstract

Two anesthetic protocols were evaluated for efficacy and comparative effects in a group of black-tailed prairie dogs. Alfaxalone-ketamine-midazolam (alfaxalone 6 mg/kg; ketamine 30 mg/kg; and midazolam 1.5 mg/kg, AKM) and alfaxalone-ketamine-dexmedetomidine (alfaxalone 6 mg/kg; ketamine 30mg/kg; and dexmedetomidine 0.15 mg/kg, AKM) were used to anesthetize 9 male prairie dogs in a randomized, complete cross-over, prospective study. Forty-five minutes after anesthetic induction with either AKM or AKD, Flumazenil (0.1mg/kg) or atipamezole (1.5 mg/kg) were administered, respectively. Every 5 minutes throughout the anesthetic period, physiologic parameters and presence or absence of reflexes were monitored. Median induction times were 82 seconds (IQR 34 seconds) and 60 seconds (QR 42 seconds) for AKM and AKD, respectively. Median recovery times were 27 minutes (IQR 5 minutes) and 21 minutes (IQR 8 minutes), respectively. 6 of 9 animals received a second reversal agent 20 minutes after the first reversal injection, but recovery quality was smooth. Both anesthetic protocols produced successful anesthesia, with all measured reflexes absent in all animals at 5 minutes post induction. Reflexes variably returned throughout the anesthetic period. HR was higher in the AKM group, but RR was lower. Both protocols resulted in decreasing body temperatures, which were significantly lower with AKM than AKD. The results of this study show that AKD and AKM can produce effective anesthesia in black-tailed prairie dogs.

Presenter: Marissa Komp

Role of palliative radiotherapy in terminal decision making in dogs with advanced cancer

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Keywords: oncology; palliative; radiotherapy; cancer; survey; dog

Abstract

Palliative radiotherapy is an effective therapeutic modality for dogs with advanced cancer. However, this control is not curative and eventually progresses, resulting in euthanasia. It may create a sense of hope in the client for control of clinical signs. This study focused on the emotional responses of clients to their pet's cancer therapy and euthanasia influenced by their human-animal bond. The goals of this study were to 1) understand the changes in the client's attitude of palliative radiotherapy throughout the various stages of treatment, 2) investigate the overall benefit to the client and pet from palliative radiotherapy and, 3) determine the effects of palliative radiotherapy on the decision of euthanasia and grieving process and coping of the client. Novel online survey was created based on a Likert scale. Fourteen dogs with advanced cancer underwent palliative radiation therapy at the Veterinary Health Center, Kansas State University were included. The online survey was sent to 20 owners and 15 owners voluntarily completed after the informed consent. Results included owner's reports of distress during the diagnosis and decision of euthanasia with feelings of hope during radiotherapy. Over half of the participants reported that the palliative radiation therapy process helped them cope with the euthanasia. This included the advantages of both an increase in the quality of life, as well as the extended time in which to prepare for their goodbye. In conclusion, palliative radiotherapy was beneficial to both the pet alleviating clinical signs and the owner preparing euthanasia and aids the grieving process.
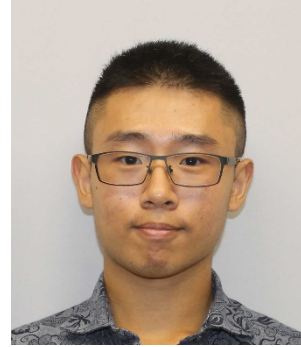
Presenter: Poyu Lai (Tony)

Elective ovariohysterectomy or castration can proceed in shelter dogs despite mild to moderate presurgical leukocytosis

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Keywords: elective ovariohysterectomy, elective castration, pre-surgical evaluation, shelter dogs, leukocytosis

Abstract

The value of the leukogram for evaluating dogs for elective ovariohysterectomy or neuter is unclear. We hypothesized that healthy-appearing dogs from a shelter environment would have higher leukocyte count than adult reference interval, but that even dogs with leukocytosis would be able to safely proceed with elective surgery. Shelter dogs (N=138) from the Kansas State University junior surgery course in 2019 were enrolled, and data collected included age (by dental exam), sex, history, physical exam, CBC and biochemistry, 4DX, treatment, and outcomes. Leukogram values were compared statistically between age groups. Forty-five percent of dogs had a leukocytosis (range 13.7-28.3 K/uL, reference interval (4.3-13.6 K/uL). There was a higher proportion of dogs < 3 months of age (70.6%) with leukocyte counts above the reference interval than dogs > 6 months of age (36.6%) (p = 0.002). Similarly, dogs < 3 months old had a higher proportion (41.2%) of lymphocytes above the reference interval than dogs ≥ 3 to ≤ 6 months old (18.2%) and dogs > 6 months old (12.2%) (p=0.008). One dog had a stress leukogram, while 39 dogs (28.3%) had a chronic inflammatory leukogram. Surgery was postponed in one dog due to parvovirus and one dog due to anaplasmosis-related thrombocytopenia; 136/138 (99%) dogs underwent successful surgery. Leukocytosis is common prior to elective surgery in healthy-appearing dogs from shelters, and adult reference intervals might not be applicable for juvenile dogs. Evaluation of leukogram should be reserved for dogs with evidence of illness or infection rather than as a screening test.

Presenter: Swetha Madesh

Serological and molecular detection of *Anaplasma* and *Ehrlichia* species in dogs from Paraguay

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Keywords: *Anaplasma phagocytophilum*; *Anaplasma platys*; *Ehrlichia canis*; Tick-borne diseases

Abstract

Introduction: Tick-borne diseases continue to threaten the health of people and dogs throughout the world. *Anaplasma* and *Ehrlichia* species are widespread in dogs. We investigated the prevalence of these pathogens in dogs from Paraguay.

Methods: Nearly 200 blood samples were assessed for *Anaplasma* and *Ehrlichia* species antibodies and nucleic acids. ELISA assays were performed for the detection of antibodies to *Anaplasma* and *Ehrlichia* species using *A. phagocytophilum* and *E. canis* whole cell antigens. Molecular analysis by PCR methods was performed for the detection of *Anaplasma platys* and *Ehrlichia canis* DNAs.

Results/discussion: A total of 181 samples were assessed and 130(71.8%) tested positive for *Anaplasma* antibodies, and 171 (94.4%) tested positive for *Ehrlichia* antibodies. Sero positives for both *Anaplasma*

and *Ehrlichia* were observed in 130 (71.8%) samples. While *A. phagocytophilum* antigens were used in the ELISA assay, the positives most likely represent *A. platys* as it is the most prevalent *Anaplasma* in dogs. *Ehrlichia canis* sero positives may also include positives for other related *Ehrlichia* species commonly infecting dogs. Indeed, pathogen-specific PCRs identified 23 (12.7%) samples to be positive for *E. canis* and 13 (7.1%) samples as positive for *A. platys*. Higher *Anaplasma* and *Ehrlichia* sero positives with low DNA positives is similar to tick-borne infections reported in dogs in the US and other parts of the world.

Conclusion: This study demonstrates the importance of rickettsial diseases impacting the canine health, thus highlighting the need for having better measures to improve companion animal health, such as disease prevention, vaccines and therapeutics.

Presenter: Lauren Ryon

Urinary obstruction in a dog secondary to os penis (baculum) hemorrhage

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Keywords: urinary; obstruction; baculum; hemorrhage; canine

Abstract

The canine os penis (baculum) is located along the distal aspect of the penis, dorsal to the urethra and corpus spongiosum. Baculum function is speculated to contribute to mating biomechanics and urethral protection. There are few published case reports on pathology of the canine baculum, with most documenting lysis secondary to neoplasia. A 4-year-old male American Bulldog presented for acute urinary obstruction and uroabdomen following a chronic history of intermittent urinary obstruction from 8 months of age. Radiographs and fluoroscopy-guided positive contrast cystourethrogram revealed and ovoid, radiolucent mass associated with the caudal aspect of the baculum, which resulted in partial urethral obstruction. Scrotal urethrostomy and penile amputation were performed, and the mass was submitted for histopathology. Results were consistent with baculum hemorrhage, possibly from prior fracture or rupture of the corpus cavernosum. The patient discharged 11 days following surgery and was able to urinate without difficulty. This case provides the second known report of urinary obstruction secondary to baculum hemorrhage in a dog, with the first published in 1990. While neoplasia is more commonly reported, hemorrhage should be considered as a differential diagnosis for lytic lesions of the canine baculum, and carries a better prognosis following resolution of urinary obstruction.

Presenter: D. Angela Thompson-Butler

Renal and cardiac effects of diltiazem continuous infusion in healthy dogs

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Keywords: calcium channel blocker, canine, echocardiography, glomerular filtration rate, urine output

Abstract

Background: Canine acute kidney injury has a high mortality rate. Diltiazem may improve renal function but can result in negative inotropy.

Objectives: The primary objective was to determine if a clinically used dose of diltiazem given as an intravenous infusion improves renal function in healthy dogs. The secondary objective was to determine the safety of this infusion by assessing ventricular function and blood pressure.

Methods: Dogs were randomized to receive diltiazem (240 μg/kg bolus followed by 6 μg/kg/min for 300 minutes) or the same volume 5% dextrose in water (D5W) and received the opposite treatment one week later. Pre- and post-infusion glomerular filtration rate (GFR), fractional excretion of sodium (FE_{NA}), echocardiographic parameters of left ventricular systolic function, and electrocardiograms were compared. Systolic blood pressure and urine output were measured continuously.

Results: GFR did not increase from baseline with diltiazem (P=0.846), and there was no difference in GFR post-diltiazem or post-D5W (P=0.695). FE_{Na} did not increase from baseline with diltiazem (P=0.813), and there was no difference in FE_{Na} post-diltiazem or post-D5W (P=0.258). There was a trend towards an increase in UOP with diltiazem, but it was not significant (P = 0.065). There were no changes in echocardiographic parameters, except post-diltiazem systolic time interval (STI) was significantly lower than post-D5W STI (P=0.046). Systemic blood pressure did not change with diltiazem (P=0.450) or D5W (P=0.940). Post-diltiazem heart rate was higher than post-D5W heart rate (P=0.047).

Conclusions: Diltiazem does not improve markers of renal function or decrease left ventricular function in healthy dogs.

Presenter: Rebecca Ullom-Minnich

Evaluation of hematologic and serum iron parameters following intravenous iron sucrose administration and serial venipuncture in healthy cats

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Keywords: Anemia; Feline; Ferritin; Functional iron deficiency

Abstract:

Background: Iron is critical for oxygen transport and erythropoiesis, yet many diseases impair gastrointestinal iron absorption. Intravenous (IV) iron sucrose is a safe and effective option in humans but has not been studied in cats.

Objectives: To evaluate IV iron sucrose safety and impact on hematologic and iron indices in healthy cats.

Methods: Five healthy research cats were administered iron sucrose (0.5 mg/kg IV) over 30 minutes. Monitoring for acute reactions (temperature, heart rate, respiratory rate, blood pressure) was performed every 5 minutes during injection and every 15 minutes for an additional hour. Baseline, 24-hour, 1-, 2-, and 3-week post-injection CBC with reticulocyte indices, iron panel (ferritin, total iron binding capacity, iron), calculated transferrin saturation (TSAT), and systemic inflammatory marker serum amyloid A (SAA) were performed.

Results: No cat experienced an acute drug reaction. SAA was increased at 24 hours versus baseline (P=.029). TSAT (P < .01) and ferritin (P=.003) decreased over time, with three cats developing functional

iron deficiency (FID) and anemia. Hematocrit (r_s=0.805; P < .0001), hemoglobin (r_s=0.770; P < .001), and reticulocyte hemoglobin content (r_s=0.581; P =.002) correlated with TSAT.

Conclusions: IV iron sucrose was well-tolerated in healthy cats but was associated with a transient increase in SAA. Further evaluation of iron sucrose dose based on iron deficit in sick cats is needed. Despite cumulative blood draw volume below recommended limits, suspected iatrogenic anemia and FID were observed, which has important implications for experimental designs and serial hematologic monitoring.

Presenter: Anne Lovett

Acute anaplasmosis reduces breeding soundness in experimentally infected beef bulls

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Keywords: Anaplasma marginale; reproduction; sperm

Abstract

Introduction: The agent of bovine anaplasmosis, *Anaplasma marginale*, costs the U.S. cattle industry ~$300 million per year. Natural service breeding is common in U.S. beef cow-calf operations. Anemia and fever associated with clinical anaplasmosis may reduce breeding soundness. The study objective was to evaluate breeding soundness outcomes and clinical changes in beef bulls during clinical anaplasmosis and after recovery.

Methods: Six healthy, *Anaplasma*-negative Angus bulls of satisfactory breeding status were enrolled. Blood from an infected donor cow was used to challenge three bulls and the other three remained unchallenged controls. Rectal temperature, packed cell volume (PCV)and mucous membranes were monitored weekly. Progression of anaplasmosis was evaluated via quantitative PCR and percent parasitized erythrocytes (PPE), and seroconversion by cELISA. Injectable oxytetracycline was administered to bulls with a PCV ≤15% or temperature ≥106°F. Weekly, standard breeding soundness examinations, performed on all bulls for 16-weeks, included sperm morphology, progressive motility, scrotal circumference, genitalia and physical examination.

Results: All *A. marginale*-challenged bulls were PCR-positive, seropositive, and clinical by 3-, 17-, and 24-days post-challenge, respectively. Clinical signs included weight loss, pallor, icterus and fever (>104.3°F). Acute anemia occurred in all challenged bulls, with PCV nadirs ≤18% and PPEs ≥50%. Reduced breeding soundness outcomes, including loss of sperm motility and normal morphology, were observed within days of clinical sign onset and continued weeks beyond disease resolution. Control bulls remained *A. marginale*-negative and breeding soundness outcomes remained within acceptable variation.

Conclusions: Findings from this study demonstrate that acute anaplasmosis can transiently reduce breeding soundness in beef bulls.

Presenter: Bailey R. Fritz

Determination of milk concentrations and pharmacokinetics of salicylic acid following acetylsalicylic acid (aspirin) administration in postpartum dairy cows

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Keywords: acetylsalicylic acid; nonsteroidal anti-inflammatory drugs; postpartum; pharmacokinetics.

Abstract

Administration of non-steroidal anti-inflammatory drugs, like the widely available drug aspirin (acetylsalicylic acid [ASA]), may improve health and milk production in postpartum dairy cows. However, there are no pharmacokinetic (PK) data and minimal pharmacodynamic data for ASA or its active metabolite, salicylic acid (SA), in the plasma or milk of lactating dairy cows. The objectives of this study were to (1) describe the pharmacokinetics of SA in the milk and plasma of postpartum dairy cows following oral ASA administration, (2) to estimate a milk withdrawal period for dairy cows treated with ASA, and (3) to determine the impact of ASA on plasma prostaglandin E_2 metabolite (PGEM) concentrations. Primiparous (n = 3) and multiparous (n = 7) postpartum Holstein dairy cows received 2

oral ASA treatments at 200-mg/kg, 24-h apart. Plasma and milk SA concentrations from 0-h through 120-h after treatment were analyzed using ultra-performance liquid chromatography triple-quadrupole mass spectrometry. Plasma PK analysis was performed using a non-compartmental approach. A milk withdrawal interval of 168-h was estimated using the FDA Milk Discard App in R (99th percentile upper tolerance limit, 95% confidence). Plasma PGEM concentrations from 0-h to 24-h after treatment were determined in duplicate using ELISA and were reduced from baseline for up to 12-h after treatment. A mean reduction in PGEM of -49.3% was observed at 2-h. Results from this study suggest that the current 24-h milk withdrawal recommendation for cows administered ASA should be revised and that ASA administration may mitigate postpartum inflammation through reduction in prostaglandin production.
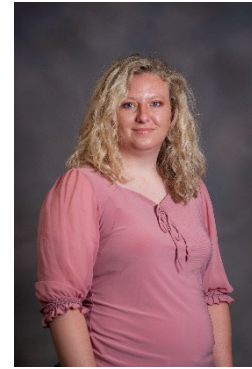
Presenter: Mikaela M. Weeder

Optimal Lameness Induction Model using Amphotericin B in Meat Goats

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Keywords: lameness, goats, Amphotericin-B, induction model,

Abstract

Lameness issues associated with livestock production continue to be a critical concern, especially among goat populations. Due to lack of literature, increased knowledge of pain responses due to lameness is required for proper treatment. The objective of this 4-day study sought to recognize the most effective lameness inducement in twenty-four meat type goats using three varying dosages of amphotericin B (Amp-B). Lameness was produced by an intraarticular injection into the left hind lateral claw distal interphalangeal joint with either a Hi-Hi, Hi-Low, or Low-Low treatment of Amp-B (n=6/group). A saline treatment of 0.5ml was used as a control (n=6). Lameness induction responses were analyzed by infrared thermography (IRT) at the induced joint, mechanical-nociception threshold (MNT), visual lameness scoring (VLS), a visual analogue scale (VAS), kinetic gait analysis (PMT), plasma cortisol (CORT), prostaglandin metabolite E (PGE), substance P (Sub P), behavior and facial grimace evaluation. Responses were taken at -24, 4, 6, 12, 24, 48, and 72h post-lameness induction. Differences between left hind (induced) and right hind (control) MNT values were significantly higher for the three treatment groups compared to the control group (P=0.0023). The High-Low goats had higher VAS measures at 24, 48 and 72 h compared to controls (P=0.02). While each Amp-B treatment was able to produce lameness, the Hi-Low treatment group (Amp-B, 5mg/0.25ml) provided the clearest reproducible lameness induction when compared to all other treatments.

Presenter: Lilli Heinen

Evaluation of predictive models to determine total morbidity outcome of feedlot cattle based on pen-level feed delivery data during the first 15 days on feed

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Keywords: Feedlot, nutrition, machine learning.

Abstract

Changes in feeding behavior and intake have been used to identify disease in individual cattle on feedlots, but not at the pen level. Correctly identifying high morbidity pens early in the feeding period could facilitate interventions to improve health and economic outcomes. The objective was to determine the ability of feed delivery data from the first 15 days on feed to predict total feeding period morbidity. Data consisted of 518 pens (10 feedlots, 56,796 head). Overall morbidity was classified into high (>15% total morbidity) or low categories with 18.5% of pens having high morbidity. Five predictive algorithms were utilized to predict overall morbidity given arrival and feeding characteristics. The dataset was split into training (75%) and testing (25%) subsets. Algorithms were generated in Microsoft Azure and evaluated based on accuracy, sensitivity (Sn), and specificity (Sp). The decision forest algorithm had the highest Sp (97%) with the greatest ability to accurately identify low morbidity lots, but this model had low Sn (33%). The logistic regression and neural network algorithms had good Sn (both 63%) with the best ability to correctly identify high morbidity lots, but a lower Sp (69 and 72%, respectively). Three models provided feature importance data demonstrating that percent change in feed delivery between days and over 4-day moving averages were of great importance. In conclusion, feed delivery data during the first 15 days on feed was an important predictor of total pen-level morbidity.

Presenter: Madeline Hall

Developing a facial grimace scale to assess pain in goats

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Keywords: goat; lameness; pain; animal welfare; grimace scale

Abstract

Facial grimace assessment based on changes to facial features in response to pain has been validated in several species to evaluate pain more objectively, rapidly, and non-invasively. This study aimed to construct a Goat Grimace Scale (GGS) as part of a larger study to identify pain associated with induced lameness. Twenty-four goats of mixed breed and sex were randomly assigned to one of four treatment groups (n = 6 goats/treatment group): a high-dose/high-volume (HH), high-dose/low-volume (HL), low-dose/low-volume (LL) intraarticular injection of amphotericin B, or a saline control (CTRL) injection only. At -24 h (baseline) and at 4, 6, 12, 24, 48, and 72 h post-induction, the goats' facial expressions were

recorded with a video camera as they walked across a pressure mat. Two observers blinded to treatment and time point utilized facial action units (FAUs) of ear position, nostril shape and dilation, orbital tightening, and cheek tightening to score a total of 351 images captured from 168 videos. Using the same time points as GGS scoring, each goat was also given a Visual Lameness Score (VLS) and Visual Analog Scale (VAS) score, which are established tools for evaluating pain associated with lameness. Both Observers 1 and 2 found that goats grimaced more at 24 h than baseline ($p<0.05$), and the HH goats grimaced more than CTRL goats ($p=0.1$). As these results correlated well with VLS and VAS measures from the larger study, a GGS may have utility in rapidly detecting and quantifying pain in goats.

Presenter: Lucas Horton

An evaluation of metaphylaxis for bovine respiratory disease in medium-risk feedlot calves and outcomes impacting antimicrobial use

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Keywords: antimicrobial use; bovine respiratory disease; feedlot; medium-risk; metaphylaxis

Abstract

Introduction: It is critical for the beef industry to explore antimicrobial use (AMU) reduction strategies. Antimicrobial metaphylaxis for control of bovine respiratory disease (BRD) is common, but it is not always clear whether it should be used in some populations (e.g., medium-risk calves). Objectives were to evaluate impacts of two BRD treatment programs on AMU metrics, health, and performance of medium-risk feedlot calves.

Methods: Crossbred beef steer and heifer calves (n = 2,366) with mean initial weight 261 kg [± 11.0 kg (SD)] were enrolled in a randomized complete block design with a 1-way treatment structure. Cattle were randomly allocated to a total of 16 pens (8 per treatment) at 2 commercial feedlots in Kansas and Nebraska. Treatments were metaphylaxis (tulathromycin) at initial processing (META), or pull-and-treat (PT; no metaphylaxis). Specific antimicrobials, order of use, and post-metaphylaxis or -treatment intervals were identical between treatments.

Results: Total BRD morbidity was 16.7% for PT compared to 7.1% for META ($P < 0.01$). Total mortality was 2.7% for PT versus 1.2% for META ($P = 0.03$).   The number of antimicrobial doses for META was

greater than for PT cattle (1.09 vs 0.21 doses/animal respectively; $P < 0.01$). However, META calves had 10.4 kg heavier carcasses per animal enrolled ($P = 0.08$).

Conclusion: Optimal strategies for BRD control may vary depending on outcomes deemed most important, as trade-offs exist between health, performance, and efforts to reduce AMU.

Presenter: Ramya Kalam

Prevalence and antimicrobial susceptibilities of pathogenic *Escherichia coli* involved in swine colibacillosis in piglets fed diets supplemented with *in-feed* and or *in-water* chlortetracycline

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Keywords: Swine colibacillosis; *Escherichia coli*; Chlortetracycline; Antimicrobial resistance

Abstract

Swine colibacillosis, caused by *E. coli* is an important enteric disease of piglets. The main pathotypes involved are enterotoxigenic (ETEC), enteropathogenic (EPEC), and Shigatoxigenic (STEC). Our objectives were to determine the effects of *in-feed* and or *in-water* chlortetracycline (CTC) administration on the prevalence of virulence genes and pathotypes and to determine the phenotypic and genotypic susceptibilities to CTC.

A total of 648 weaned piglets (21 days age), housed in 24 pens, were assigned randomly to control, in-feed CTC, or in-water CTC. The CTC was provided from days 0 to 14. Fecal samples were collected from five piglets in each pen on days 0, 14 and 28. Samples were enriched and subjected to a 11-plex PCR assay to detect major virulence genes and a culture method to isolate and identify the pathotypes. Isolates were subjected to the CTC susceptibility testing.

The fecal prevalence of the virulence genes and the pathotypes were not affected by CTC administration ($P > 0.05$). The predominant enterotoxin genes in enriched feces were *estB* (heat stable enterotoxin B; 100%), *astA* (enteroaggregative heat stable; 97.5%), and *estA* (heat stable enterotoxin A; 92.5%). The

predominant enterotoxin genes in *E. coli* isolates were *astA* (44.5%), and *estB* (38.5%). The *stx*2 was the predominant Shiga toxin gene. All isolates were resistant to CTC, and *tet*A (91.5%) was the most predominant gene.

In-feed and or *in-water* CTC administration had no effect on the fecal prevalence of virulence genes and pathotypes implicated in swine colibacillosis and on phenotypic and genotypic CTC susceptibilities.

Presenter: Deepak Kumar

Antibody response to Rotavirus A and C in gilts after natural planned exposure and their piglets

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Keywords: Rotavirus; swine; *natural planned exposure (NPE)*; antibody; next generation sequencing (NGS)

Abstract

Introduction: This study was designed to investigate the effect of NPE to gilts on providing genotype specific lactogenic immunity to their piglets.

Methods: Pregnant gilts on a commercial farm were randomly enrolled in 4 groups including group 1 (3 dose), group 2 (2 doses), group 3 (1 dose) and a control group (no NPE). Blood and milk samples from gilts/sows and piglets (5 per litter) were collected at multiple time-points. VP7 and VP4* proteins of RVA and RVC were expressed, and used in ELISA to determine end-point antibody titers. Piglets shedding RVs under the lactogenic immune pressure were selected for NGS.

Results: For RVA, group 1 had higher colostrum anti-RVA IgG and IgA titers for all proteins except G4 compared to other study groups. Group 1 piglet serum IgG levels at day 0 were highest for G5, P[7] and P[23]. Group 3 piglet serum samples had higher IgA Ab titers at day 0 for all proteins than group 1, 2 and control group. Only two litters shed RVA before-weaning and contained a different RVA genome constellation than NPE. For RVC, colostrum P[5] IgG and IgA titers were higher in group 1 than other groups. Group 1 piglet serum P[5] IgG and IgA levels were significantly higher than other groups at day 0 and 7. Multiple piglet litters shed RVC before weaning and shared same G6P[5] genotypes as in NPE. Lastly, anti-VP4* titers were manifold higher than anti-VP7 titers for both RVA and RVC.

Conclusion: RVA antibody levels were significantly higher than RVC in colostrum and piglet serum samples. Low maternal RVC antibody levels in colostrum and piglet serum might be responsible for higher neonatal RVC prevalence in piglets.

Presenter: Conrad Schelkopf

Comparison of three diagnostic tools for detection of ketosis in early lactation dairy cows

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Keywords: ketosis; dairy cattle; electronic nose.

Abstract

Introduction: Rapid diagnosis of ketosis in dairy cows is imperative for treatment and managing economic losses. Cow-side ketosis diagnostic tools are greatly needed. The objective of this study was to compare three tools for the detection of ketosis, using serum β-hydroxybutyrate (BHB) as the gold standard. The diagnostic tools tested were: (1) a handheld blood ketone meter (Precision Xtra[1]), (2) a urine test strip (ReliOn[2]), and (3) an electronic nose (enose) (Cyranose 320[3]).

Methods: Dairy cows (n= 60) were sampled immediately post-calving between May – August 2021. Whole blood (n=172), serum (n=172), milk (n= 96) and urine (n=160) was collected and analyzed on the same day. Each modality was compared to BHB to determine sensitivity and specificity. Positive predictive value (PPV) and negative predictive value (NPV) were calculated across a range of ketosis, consistent with reported prevalence (10–35%) worldwide. [[1] Abbott Laboratories, Illinois, USA [2] Wal-Mart, Inc., Arkansas, USA, [3] Sensigent, California, USA]

Results: Ketone urine strips provided the highest specificity (99.2%) and lowest sensitivity (58.6%), while the enose displayed low sensitivity (58.8%) and poor specificity (44.3%). The handheld ketone meter demonstrated adequate sensitivity (93.8%) and specificity (92.9%). Although the actual predictive values change with prevalence, the urine strips had the highest PPV (89.5–97.6%) and the ketone meter had the highest NPV (99.3–96.5%) across all simulated ketosis prevalences.

Conclusions: Both urine test strips and the handheld ketone meter are adequate cow-side ketosis detection tools. Further optimization of the enose is needed before deployment as a field diagnostic tool.

Presenter: Trey Neyland

360-Degree uterine torsion with bilateral hydroureters in a 4-year-old hembra alpaca

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Keywords: Uterine; Torsion; Ureter; Hembra; Alpaca.

Abstract

A 4-year-old hembra alpaca presented for a one-day history of depression, lethargy, inappetence, decreased water intake, decreased fecal production and anuria. The patient was presumed to be 10-11 months in gestation.

Initial physical exam revealed pyrexia, dull mentation, a hypomotile C1, and a severe uremic odor of the oral cavity. While standing the patient would squat and strain. Rectal and vaginal palpation were within normal limits.

Transabdominal ultrasound confirmed the patient was in late gestation. No fetal heart beat could be appreciated on ultrasound. There was no significant free fluid in the abdomen and the bladder was not distended. Serum chemistry revealed a marked azotemia, hyperkalemia, hypocalcemia, moderate hypochloremia, mild hyperglycemia, anemia, and metabolic acidosis. The following results were consistent with severe renal disease. The degree of azotemia was most consistent with a post-renal obstruction; however, a renal or pre-renal component could not be ruled out.

Due to a grave prognosis, the patient was euthanized and upon necropsy was diagnosed with a 360-degree pre-cervical uterine torsion involving both the ureters. Uterine torsions are commonly diagnosed in late pregnant camelids presenting for abdominal discomfort or colic, and typically carry a good prognosis upon correction. Ureteral involvement in uterine torsions is a rare complication reported in bovine, ovine and humans, but this is the first documented case in a New World Camelid.

Presenter: Anastasia McHaney

Goose egg on a goat head: imaging characteristics of a congenital vascular anomaly

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Keywords: vascular anomaly; congenital; hemangiosarcoma; vascular neoplasia; goat

Abstract

Background: Congenital tumors are generally defined as those tumors present before birth up to around 2 months of age. Congenital tumors of vascular origin specifically have been rarely reported in veterinary species. The imaging features of congenital vascular tumors have been poorly characterized, likely due in part to low case numbers.

Case Description: A 1 month old Nubian buck presented for evaluation of a large mass which had been present since birth and was demonstrating synchronous growth. Sonographic evaluation showed a highly vascular, locally invasive, heterogenous mass with foci of mineralization. Computed tomography showed a minimally invasive, strongly contrast enhancing, heterogenous soft tissue mass associated with a nest of aberrant, dilated vessels. There was also significant distension of the cranial vena cava associated with the mass. Considered differentials included a vascular hamartoma, hemangioma, and vascular malformation, with malignant neoplasia such as hemangiosarcoma being considered less likely. Surgical removal of the mass was successful, without mass recurrence or neurologic deficit. Histopathology was consistent with a subcutaneous hemangiosarcoma.

Discussion: While congenital hemangiosarcoma is considered uncommon, occasional case reports have been described in horses and cattle. Most of the reports on treatment and prognosis related to subcutaneous hemangiosarcoma have been reported in dogs. Subcutaneous hemangiosarcoma can achieve a good prognosis with wide surgical margins and early surgery performed prior to distant metastasis, although local recurrence rate is high. Unfortunately, the imaging features of subcutaneous

hemangiosarcoma are similar to other vascular tumors, meaning that histopathology is needed for definitive diagnosis.

Presenter: Konner Cool

SARS-CoV-2 infection and transmission in adult white-tailed deer

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Keywords: SARS-CoV-2; COVID; Wildlife; Deer; Transmission

Abstract

Introduction: In the last twenty years, three virus species from the genus *Betacoronavirus*, including SARS-CoV-2*,* have spilled over from animal populations into humans, resulting in outbreaks of respiratory disease and global economic losses. White-tailed deer (WTD; *Odocoileus virginianus*) are amongst the most abundant, densely populated, and geographically widespread ruminant species in the United States. In the present study, the susceptibility and transmission of SARS-CoV-2 in adult WTD were investigated.

Methods**:** Four WTD were inoculated simultaneously with two SARS-CoV-2 isolates representative of ancestral-like linage A and the Alpha variant of concern (VOC; B.1.1.7). Two sentinels were introduced to evaluate transmission. Nasal, oral, and rectal swabs as well as tissues were analyzed for the presence of SARS-CoV-2-specific RNA. Serum was evaluated for the presence of virus neutralizing antibodies and antibodies to SARS-CoV-2 specific proteins by indirect ELISAs. Next generation sequencing was used to determine presence and transmission of the individual SARS-CoV-2 strains in the principal infected and sentinel animals.

Results**:** SARS-CoV-2-inoculated WTD shed viral RNA and/or infectious virus through their nasal, oral and rectal cavities for up to 7 days post challenge. Both principal infected and sentinel WTD produced SARS-CoV-2-specific and neutralizing antibodies. Transmission to sentinels occurred within 2 days of co-housing. We determined that the SARS-CoV-2 Alpha VOC was the dominant virus strain detected in the nasal and oral cavities and tissues of WTD.

Conclusions: These results show that adult WTD are highly susceptible to experimental SARS-CoV-2 infection and highlight the importance for continued surveillance in domestic and wild WTD populations.

Presenter: Jonathan Ferm

Targeted mutagenesis in *Anaplasma phagocytophilum* for modified live vaccine development

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Keywords: *Anaplasma phagocytophilum*; zoonotic; tick-borne; mutagenesis; vaccine

Abstract

Background: *Anaplasma phagocytophilum* is an obligate tick-borne bacterial pathogen affecting a wide range of hosts. It is known to infect humans, dogs, cats, cattle, sheep, and horses. To date no vaccines are available to prevent *A. phagocytophilum* infections and doxycycline/tetracycline administration is the only treatment option. A phage head-to-tail connector protein (PHTCP) gene is identified as essential for *Ehrlichia chaffeensis* and *Anaplasma marginale.* Our recent studies also demonstrated that functional disruption mutation of this gene causes attenuated growth and clearance of the pathogens from vertebrate hosts and offer protective immunity against virulent infection challenges.

Methods: As PHTCP gene homologs are conserved in rickettsiales, we considered it as the ideal target for both establishing mutagenesis methods for *A. phagocytophilum* and to investigate its value as a vaccine. Molecular methods were employed to generate homologous recombination construct to disrupt the gene. Subsequently, allelic exchange protocol was employed in generating targeted mutation in *A. phagocytophilum*. Mutagenesis was performed on cell-free bacteria recovered from ISE6 tick cell line and cultured in the presence of selection media containing gentamycin and monitored for mCherry expression, as the mutant is expected to contain gentamycin resistance and mCherry protein genes.

Results: Clonally purified *A. phagocytophilum* mutant was generated. The presence of functional gene disruption mutation was confirmed by molecular methods in cultured bacteria resisting to gentamycin and expressing mCherry.

Conclusion: This study represents the first development of targeted mutagenesis in *A. phagocytophilum*. Work is now in progress to test its effectivity as a vaccine candidate.

Presenter: Dominica Genda

RNA analysis of 7-genes spanning from ECH_0659 to ECH_0665 encoding for several phage-related proteins in *Ehrlichia* and *Anaplasma* species.

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Keywords: Tick borne; *Ehrlichia chaffeensis*; *Ehrlichia canis*; *Anaplasma phagocytophilium*; ECH_0659 to ECH_0665.

Abstract

Background: Tick borne anaplasmosis and ehrlichiosis are major health threats to people and companion animals. Currently there are no vaccines available to prevent the diseases. Our previous study reviled that the phage heal-to-tail connector protein (Ech_0660) gene is essential for bacterial survival, and its disruption aids in the vaccine development.

Methods: The genes spanning upstream and downstream to ECH_0660; ECH_0659-ECH_0665 (7-gene segment) encode for several phage proteins in *E. chaffeensis.* These genes are conserved in related *Anaplasmataceae* family bacteria. We performed RNA analysis targeting the 7-genes to define the relatedness and impact of ECH_0660 mutations. We performed RNA analysis for four *E. chaffeensis* isolates and an isolate each of *Ehrlichia canis* and *Anaplasma phagocytophilium.* The analysis was also performed for bacteria having mutations in ECH_0660 orthologs in the three species.

Results: All 7 gene RNA expression was observed for *E. chaffeensis* Arkansas isolate. Transcripts for ECH_0662 and ECH_0664 genes were absent for St. Vincent and Heartland, while Wakula isolate lacked transcripts only for ECH_0664. In *E. canis* ECH_0662 ortholog expression was similarly absent, whereas *A. phagocytophilum* had transcripts for all 7 genes. All three species mutants did not produce

transcripts for the gene. The mutations did not impact the gene expression from other 6 genes of the region.

Conclusion: Defining the RNA expression in mutant bacteria is critical to ensure that there are no off target effects in the gene expression near the mutational sites. This study evaluated three pathogenic wild-type and mutant rickettsiales to be used in vaccine studies (in progress).

Presenter: Taeyong Kwon

Ancestral lineage of SARS-CoV-2 is more stable than Alpha and Beta variants of concern in human biological fluids

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Keywords: SARS-CoV-2, variants of concern, environmental stability, virus decay.

Abstract

Background: SARS-CoV-2 is primarily transmitted through respiratory droplets from infected persons; however, the virus-laden excretions can contaminate surfaces which can serve as a potential source of infection. Since the beginning of the pandemic, SARS-CoV-2 has continued to evolve and accumulate mutations throughout its genome, leading to the emergence of variants of concern (VOCs). However, the stability of SARS-CoV-2 VOCs has not been thoroughly investigated so far. The aim of this study was to determine and compare the stability of different SARS-CoV-2 strains, representing the ancestral Wuhan-like lineage A, the Alpha VOC B.1.1.7, and the Beta VOC B.1.351 strains, in human biological fluids under indoor and different climatic conditions.

Methods: A total of 5×10^4 TCID$_{50}$ of each strain of SARS-CoV-2 was mixed with nasal mucus, sputum, and saliva in a 2mL tube or on a stainless surface. The mixture on the steel surface was completely air-dried. The virus-spiked biologicals in the 2 mL tube and on stainless steel were incubated under indoor, summer, spring/fall and winter conditions for up to 21 days post contamination. At various days post contamination, infectious virus was recovered and titrated to calculate the respective biological half-life values.

Result: The results show that the ancestral strain was more stable than the two VOCs in liquid nasal mucus and sputum. In liquid saliva, we found longer survival of the ancestral strain than the Beta VOC only under winter conditions. In contrast, there was no difference in stability among the three strains in dried biological fluids on surfaces.

Conclusions: These findings provide insight into SARS-CoV-2 strain differences on virus stability under different climatic conditions; this work is important for the development of countermeasures against SARS-CoV-2.

Presenter: Jayden McCall

Identification of protective antigens from African Swine Fever Virus proteome

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Abstract

African Swine Fever Virus (ASFV) poses a serious threat to the pork industry, but there is no safe vaccine or treatment available. Development of a protective subunit vaccine requires empirical identification of cognate antigens. The ASFV pp220 polyprotein, encoded by a 7.4 kb gene, is critical for virus production. This polyprotein is processed to generate p14, p34, p37, and p150 individual proteins with the last one being the largest subunit. To identify T cell epitopes, pools of predicted SLA-I binding 9-mer peptides were screened by IFN-γ ELISpot assay using PBMCs and splenocytes from pigs immunized with a cocktail of adenoviruses expressing the proteins. Individual peptides from positive pools were then evaluated for ability to induce IFN-γ$^+$ PBMC and splenocyte recall responses. Four peptides, namely p34$^{161-169}$, p37$^{859-867}$, p150$^{1363-1371}$, and p150$^{1463-1471}$, recalled strong IFN-γ$^+$ PBMC and splenocyte responses. Peptide p34$^{161-169}$ was recognized by PBMCs isolated from 7/10 pigs and by splenocytes isolated from 8/10 pigs. Peptides p37$^{859-867}$ and p150$^{1363-1371}$ stimulated recall IFN-γ$^+$ responses in PBMCs and splenocytes isolated from 8/10 pigs, whereas peptide p150$^{1463-1471}$ recalled responses in PBMCs isolated from 7/10 pigs and splenocytes isolated from 9/10 pigs, respectively. The results show that pp220 polyprotein contains multiple T cell epitopes that induced robust IFN-γ$^+$ responses in commercial pigs. Notably, these epitopes are conserved among different ASFV genotypes and were predicted to bind different SLA-I

alleles. These outcomes and our previous demonstration that pp220 induces strong IgG and CTL responses suggests that pp220 is a promising candidate for inclusion in a prototype vaccine.

Presenter: Alyssa McCormick

Development of a 4-plex qPCR assay for the detection and quantification of species and subspecies of *Fusobacterium necrophorum* and *Fusobacterium varium* in bovine rumen fluid

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Abstract

Fusobacterium necrophorum and *F. varium* are Gram-negative, anaerobic bacteria and normal ruminal inhabitants. Two subspecies of *F. necrophorum* exist, subsp. *necrophorum* and subsp. *funduliforme,* with subsp. *necrophorum* being the primary causative agent of liver abscesses in feedlot cattle. Currently, no PCR assays exist to quantify *F. varium* and both subspecies of *F. necrophorum*. Our objective was to develop, validate, and determine applicability of the qPCR assay for the quantification *F. necrophorum* and *F. varium*.

Assay targets were the species-specific *hgdA* gene, encoding for (R)-2-hydroxyglutarylCoA dehydratase subunit alpha, and the subspecies-specific promoter sequence of the leukotoxin gene, *lktA*. Assay specificity was validated using *Fusobacterium* and other bacterial species. Assay sensitivity was determined using pure cultures and rumen fluid spiked with pure cultures. Applicability of the assay for quantification was determined using rumen fluid from slaughtered cattle.

Species and subspecies-level specificities were confirmed. Pure culture detection limits were 10^2 to 10^3 for the two species and subspecies. Application of the assay to rumen fluid collected from cattle with healthy livers (n=42) and abscessed livers (n=37) indicated that 96% of samples contained *F. funduliforme*, with a mean concentration of 5.7×10^3 in healthy cattle with and 1.4×10^4 in liver-abscessed

cattle. Additionally, *F. varium* and subsp. *necrophorum* were more prevalent in samples from cattle with abscessed livers (70% and 54%) compared to cattle with healthy livers (40% and 11%).

In conclusion, the novel assay allowed for differentiation and quantification of *F. necrophorum* at the species and subspecies-level and of *F. varium* in bovine rumen fluid.

Presenter: Kamilyah R. Miller

Detection of *Trypanosoma cruzi* in raccoons and triatomes in northeast Kansas

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Keywords: *Trypanosoma cruzi*, wildlife, Kansas

Abstract

Background: In 2018, a red panda (*Ailurus fulgens*) presented to Kansas State Veterinary Health Center for decreased appetite and lethargy, Trypanosoma *spp. T*rypomastigotes were found on blood smear, and later confirmed as *Trypanosoma cruzi* genotype 1 through molecular testing. This motivated additional investigation into the prevalence, and infection risks, of *T. cruzi* and its vectors in northeast Kansas.

Methods: The local zoo staff collected 53 Triatome specimens and 14 raccoons (*Procyon lotor*) on the premises. Whole blood, heart muscle, spleen, and skeletal muscle were collected from the raccoons for further testing. Raccoon and insect tissues were processed for PCR to identify *Trypanosoma* spp. DNA using primers targeting 24Sa ribosomal subunit gene. Raccoon tissues were also submitted for histopathology at the Kansas State Veterinary Diagnostic Laboratory.

Results: In total, 28 *Triatoma sanguisuga* females, 14 *T. sanguisuga* males and 10 *T. sanguisuga* 5th Instar nymphs were collected. Two (4%) female *triatomine* insects tested positive for *T. cruzi*. One (7%) raccoon whole blood sample tested positive for *T. cruzi* DNA with the sequence most closely matching TcI lineages. In addition, *Trypanosoma cruzi* DNA was also amplified from heart tissue, and amastigotes were found on

histologic examination. Several raccoons had microscopic evidence of mild, interstitial lymphohistiocytic myocarditis and skeletal muscle myositis that is consistent with previous reports of *T. cruzi* in raccoons.

Conclusion: Positive raccoon and triatome specimens indicates a low, but present, risk for transmission of Chagas disease to domestic animals and humans in northeast Kansas.

Presenter: Morgan Hull

Anti-Bovine Serum Albumin IgG antibody production in horses post-vaccination

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Keywords: horses; anti-BSA IgG antibodies; hypersensitivity reaction

Abstract

Post-vaccination hypersensitivity reactions in horses may be fatal. Bovine serum albumin (BSA), a common vaccine component, may stimulate production of anti-BSA antibodies and prime the immune system for future hypersensitivity reactions upon booster vaccination. The objective of this study was to measure levels of total and isotype 3/5 anti-BSA IgG antibody pre- and post-vaccination in healthy horses and horses that experienced a vaccine-associated hypersensitivity reaction. We hypothesized that horses would develop anti-BSA IgG post vaccination, and horses with documented hypersensitivity reactions would have greater anti-BSA IgG levels compared to non-reactor horses. 74 clinically healthy horses had serum collected pre-vaccination and at 2 weeks, 1, 3, 6, 9, and 12 months post-vaccination. Serum was acquired from 25 horses that had a post-vaccination hypersensitivity reaction. Anti-BSA IgG and IgG 3/5 antibodies were measured via ELISA. Unvaccinated horse serum and commercial hyperimmunized equine plasma served as negative and positive controls, respectively. O.D. values were normalized to the negative control. Both anti-BSA IgG and anti-BSA IgG 3/5 antibodies were significantly increased from pre-vaccination values by two-weeks post-vaccination. This increase persisted at three months post-vaccination then returned to baseline 6 months post-vaccination. The 25 horses with a hypersensitivity reaction did not have significantly increased anti-BSA IgG 3/5 or total IgG, compared to pre-vaccination levels of the clinically healthy samples. The results support that horses develop

antibodies to BSA contained in vaccines however there is not an association between anti-BSA IgG 3/5, in hypersensitivity reactions to equine vaccines.

Presenter: Nathan Jackson

Role of estrogen in intestinal ischemia-reperfusion injury

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Keywords: Ischemia-Reperfusion, Estrogen, Eicosanoid, Cytokine

Abstract

Stroke, myocardial infarct, gastrointestinal injury, and many more conditions result from ischemic events, but the return of blood flow during treatment leads to reperfusion injury. Ischemia-Reperfusion (I/R) injury is the leading cause of human death and severe injury in first-world nations. In animal health, clinical scenario examples of I/R include equine colic and canine gastric torsion. Animal models increase our understanding of the mechanisms of injury and demonstrate differences in damage between sexes. The post reperfusion role of estradiol in the immunoinflammatory response is not well studied. Estradiol was predicted to modulate the innate immune response and this hypothesis was studied using in vitro and in vivo experiments. As a significant contributor to the innate immune response, macrophages (cell line and bone marrow-derived) were treated with or without estradiol prior to being exposed to normoxia and hypoxia. In vivo studies included subjecting homozygote or heterozygote (control) estrogen receptor 2 (ESR2)- deficient mice and wildtype or ovariectomized mice to intestinal I/R injury. Preliminary studies indicate that intestinal eicosanoid concentrations significantly increase in ESR2 knockout female mice without significantly affecting male mice. The absence of estradiol signaling increases injury in female but not male ESR2 knockout mice when compared to wildtype mice. Overall, it appears that estradiol changes the immunostimulatory mechanism of intestinal I/R induced injury.

Presenter: William Johnson

Comparison of Mini-FLOTAC and Modified McMaster techniques to enumerate gastrointestinal parasites in naturally infected North American bison herds

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Keywords: Bison, Parasitology, Diagnostics.

Abstract

Introduction: The intensity of gastrointestinal parasitism with strongyles and coccidia in ruminants is measured as eggs/oocysts per gram of feces. The McMaster technique has been used for decades in the quantification of these parasites. The Mini-FLOTAC technique is a novel method that is revolutionizing both field and lab diagnostics. Its use in quantitative diagnostics has not been studied in bison. There is relatively little research on parasites in North American bison (*Bison bison*) in the United States.

Methods: Samples from 387 naturally infected bison originating in 7 midwestern states were analyzed. Fresh fecal samples were collected, refrigerated, and shipped by the herd managers to the lab. For each sample one Mini-FLOTAC and three McMaster counts of trichostrongyle eggs and Eimeria oocysts were compared. The Mini-FLOTAC had a sensitivity of 5 eggs per gram (EPG)/oocysts per gram (OPG) and the modified McMaster slides had a sensitivity of 33.33 EPG and OPG.

Results: A strong correlation was found between egg counts in Mini-FLOTAC and McMaster tests in triplicate. When McMaster tests were performed in duplicate or singly there was a lower correlation with the Mini-FLOTAC. For Eimeria oocysts counts, significantly weaker correlations were found with triplicate, double, and single McMaster tests when compared to the Mini-FLOTAC.

Conclusions: When McMaster slides are used in triplicate the results are comparable for strongyle egg counts when compared to the Mini-FLOTAC egg counts. For Eimeria oocysts counts there was less comparability between the two techniques.

Presenter: Daniel Madden

Identification of cellular factors involved in African Swine Fever virus infection

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Keywords: African swine fever virus; CRISPR-Cas9; host-factor, COS-1 cells

Abstract

Introduction: African swine fever (ASF) is a highly contagious and lethal disease of domestic and wild pigs caused by the African swine fever virus (ASFV) which inflicts severe economic losses to the global pork industry. Currently, there are no vaccines or therapeutics available to control ASF. A better understanding of essential host cell factors for ASFV infection and replication is needed to enhance knowledge of basic ASFV biology, guide vaccine development, and identify potential antiviral drug targets.

Methods: We used a lentivirus-based CRISPR-Cas9 system to generate Genome-wide CRISPR Knock-Out (GeCKO) COS-1 cells with over 120,000 potential sgRNAs targeting more than 19,000 genes. GeCKO COS-1 cells were selected for resistance to ASFV replication by two serial infections with a modified ASFV Armenia 2007 strain (Arm07/ΔCD2v-GFP). Genomic DNA from the uninfected GeCKO COS-1 cells and

ASFV resistant GeCKO COS-1 cells was PCR amplified, then the amplicons screened by next-generation sequencing (NGS) and analyzed with the MAGeCK program.

Results: Our screening of ASFV resistant GeCKO COS-1 cells identified 960 host genes (p<0.05) that could play a role in ASFV replication. Further analysis showed positive enrichment for pathways associated with COPII vesicle loading, transcriptional regulation, and transmembrane ion transportation.

Conclusions: GeCKO COS-1 cells were established and used to identify host genes and pathways associated with ASFV replication. Additional experiments targeting individual host genes using siRNA and single gene knockout COS-1 cells will further confirm these findings.

Presenter: Chester D. McDowell

Assessment of SARS-CoV-2 strain competition in co-infected adult white-tailed deer

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Keywords: SARS-CoV-2; White-tailed Deer; Variants of Concern; RT-qPCR; Next-Generation Sequencing

Abstract

Introduction: SARS-CoV-2 has spread around the world, resulting in a global public health crisis. Early in the pandemic, ancestral lineage A of SARS-CoV-2 dominated; however, variants of concern (VOCs), characterized by increased fitness and transmissibility have emerged. For example, the lineage B alpha VOC (B.1.1.7) emerged in the fall of 2020 and rapidly became a dominant variant. White-tailed deer (WTD; *Odocoileus virginianus*) have been shown to be a potential secondary reservoir for SARS-CoV-2. To investigate the role of a VOC in this host, we conducted a competition experiment whereby adult

WTD were co-infected with an ancestral lineage A (USA-WA1/2020) and a lineage B alpha VOC (B.1.1.7-like; USA/CA_CDC_5545/2020) SARS-CoV-2 isolate.

Methods: Nasal swabs and respiratory tissues from co-infected WTD were evaluated using next generation sequencing (NGS) and BLAST-based analysis. The percentages of individual lineage A and B viruses were determined at multiple time points post-infection. NGS results were confirmed using lineage-specific RT-qPCR assays targeting a non-conserved region within the spike gene.

Results: The SARS-CoV-2 lineage B alpha VOC quickly became the dominant virus in WTD following co-infection with the ancestral lineage A and lineage B alpha VOC viruses. The ancestral lineage A strain was only recovered at early time points in small quantities. The newly developed lineage A- and B-specific RT-qPCR assays were capable of differentiating both SARS-CoV-2 lineages with high accuracy.

Conclusion: SARS-CoV-2 lineage B alpha VOC showed improved fitness compared to the ancestral lineage A virus after co-infection of adult WTD. The lineage-specific RT-qPCR assays have potential applications in epidemiological surveillance for VOCs.

Presenter: Theresa A. Quintana

Capturing coronaviruses: comparison of recovery methods for infectious coronaviruses from environmental surfaces

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Keywords: Coronavirus; Virus Recovery; Infectious Virus.

Abstract

Background: Quantification of infectious virus rather than viral RNA provides more accurate assessments of transmission risk for COVID-19. The ability of InnovaPrep Mano Surface Samplers (MANOs) to recover infectious coronavirus from large surface areas was unknown yet hypothesized to outperform traditional cellulose sponges (sponges).

Method: In triplicate, 1.0×10^5 $TCID_{50}$ of human coronavirus OC43 or SARS-CoV-2 was applied to literature or vendor specified optimal areas within a biological safety cabinet, 1267.36 cm^2 (MANO) and 100 cm^2 (sponges). The areas were sampled with eluant presoaked MANOs or sponges, and samples aliquoted and stored at -80°C until batch titration by indirect immunofluorescence (OC43) or crystal violet detection-based (SARS-CoV-2) $TCID_{50}$ assays. Eluants tested included pH 7 beef extract buffer (BEB7) with and without 0.05% tween-20 (T) and, for MANOs only, PBS/T, (vendor default). Additionally, an expanded area (0.77m^2 for MANOs, 300cm^2 for sponges) was tested with OC43 as described above, except with a 1.0×10^4 $TCID_{50}$ inoculum.

Results: For OC43, the highest recovery was with MANOs BEB7 (2.66×10^5 $TCID_{50}$, 102%), lowest with MANOs PBS/T (4.40×10^4 $TCID_{50}$, 17%). By one-way ANOVA ($\alpha=0.05$), both MANO BEB7's and BEB7/T's recovery percentages were significantly greater than PBS/T's. For the expanded area, recovery was only detectable with sponges BEB7/T (3.23×10^3 $TCID_{50}$, 32%). Preliminary data for SARS-CoV-2 indicated decreased recovery of infectious virus for all eluants and both tools.

Conclusion: Use of BEB7 improved OC43 and SARS-CoV-2 recovery from optimal areas with MANOs. Due to their increased surface area capabilities, MANOs may enhance environmental sampling in large industry settings.

Presenter: Nicole Robben

Effect of mosquito salivary proteins on human endothelial physiology

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Keywords: angiogenesis, mosquito, HUVEC

Abstract

Mosquito saliva has garnered significant interest due to its potent immunomodulatory effects, yet most of its effects on human cells remain unknown. Previous RNA sequencing of Human Umbilical Vein Endothelial Cells (HUVEC) incubated with mosquito salivary gland extracts (SGE) revealed altered expression of genes involved in the regulation of angiogenesis, cell survival, and inflammation. This study aimed to investigate further how these changes impact the host in a way that may lead to increased susceptibility to diseases like cancer or arthropod-borne pathogens. Rt-qPCR was performed using RNA from HUVEC cells incubated with SGE from *Anopheles*, *Aedes* and *Culex* mosquitoes, or the salivary peptide Apyrase 1 (Apy1). We also evaluated the effect of salivary proteins on angiogenesis and cell proliferation (MTT and LDH levels). Interestingly, when incubated with SGE and Apy1, HUVEC cells displayed differences in transcriptome expression, with SGE upregulating pro-angiogenic genes while Apy1 upregulated inhibitory Neurofibromin and SP100. This difference is also seen in the angiogenesis assay in which Apy1 displayed a significant increase in individual cells. MTT and LDH Cytotoxicity assay results showed no significant differences. These results suggest the action of Apy1 is distinct from SGE.

Presenter: Trey Tomlinson

Surveillance of *Borrelia burgdorferi* in white-footed mice (*Peromyscus leucopus*) in Pennsylvania

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Keywords: Lyme Disease; Surveillance; PCR; Mice

Abstract

Lyme disease, caused by the spirochete *Borrelia burgdorferi*, is the most prevalent vector-borne disease found in the United States. Direct disease transmission to humans and other species occurs through the feeding of infected *Ixodes* ticks. Due to the ongoing expansion of its tick vector, there is a need for robust surveillance programs to continually monitor *B. burgdorferi* prevalence in wildlife reservoirs as this directly impacts disease incidence and influences control programs. To aid in this effort, this study focuses on identifying the prevalence of *B. burgdorferi* in wild *Peromyscus leucopus,* a known Lyme reservoir, from an endemic area in Pennsylvania. Both blood and ear tissue samples were analyzed for the presence of the bacterium using a nested polymerase chain reaction targeting *Flagellin B* gene. A total of 10/378 (2.65%) blood and 59/272 (21.69%) tissue samples tested PCR positive. All positive sequences have most closely matched *B. burgdorferi* sensu stricto sequences in GenBank. Comparing the two sample types, there were 204 paired samples from the same animal. There were 3 paired ear/blood samples that tested positive and 160 pairs that tested negative, while there were 36 animals that only tested positive by tissue PCR and 5 only by blood PCR. This study highlights the role of white-footed mice as a reservoir for *B. burgdorferi*. While ear tissue might be the optimum sample for cost-effective surveillance, the addition of blood testing may provide a more accurate description of the true prevalence of the pathogen in these animals.

Presenter: William Tyrus Weng

Experimental infection of ferrets with different SARS-CoV-2 lineages

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Keywords: COVID19, virology, next generation sequencing, coronavirus

Abstract

SARS-CoV-2 has resulted in a global pandemic with significant negative impacts on global health and socioeconomics. Recently, the disease ecology of SARS-CoV-2 has been complicated by the emergence of variants of concern, i.e. mutant isolates with increased transmissibility that have supplanted the original circulating viral lineage. Mustelids, including mink and domestic ferrets (Mustela putorius), are highly susceptible to experimental SARS-CoV-2 infection, making them species of concern as potential reservoirs. Ferrets have been successfully used as a model species to investigate SARS-CoV-2 virulence, transmission, and host adaptation. In this study, we used the ferret model to investigate infectivity and transmission of a lineage A virus and an alpha variant, also known as lineage B.1.1.7. Ferrets were inoculated intranasally with equal amounts of the original SARS-CoV-2 lineage A isolate (USA-WA1/2020) and an Alpha variant lineage B.1.1.7 isolate (USA/CA_CDC_5574/2020). Uninoculated ferrets were co-housed with infected ferrets to determine the transmissibility of the respective isolates. Clinical samples (nasal washes/oropharyngeal swabs) were collected and subjected to next generation sequencing and bioinformatic analysis to determine relative percentages of lineage A and lineage B.1.1.7 genetic material in each sample. The results of this study provide information regarding the relative fitness of the SARS-CoV-2 alpha variant, including transmissibility, in an established model species, and provides information regarding the potential of ferrets to become a secondary reservoir for recently emerged SARS-CoV-2 variants.

Presenter: Erica Chavez-Peon Berle

Multifocal spinal inflammatory myofibroblastic tumors in a juvenile paraparetic dog

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Keywords: Inflammatory; myofibroblastic; pseudotumor ; imaging ; compressive myelopathy

Abstract

Inflammatory myofibroblastic tumors (IMT) have been infrequently reported in the spine of dogs. Extradural and intramedullary locations have been described with the presence of a solitary mass, however, a multifocal presentation has not been previously described.

A 1-year-old, female intact English Bulldog presented for a history of progressive paraparesis. Neuroanatomical localization based on physical exam findings was consistent with a T3-L3 myelopathy. Magnetic resonance imaging revealed a severely compressive extramedullary, dorsal, broad-based, minimally contrast enhancing mass at the level of L3-4, that was T1w iso and T2w hyperintense. Additional similar, non-compressive nodules were present along the extradural space and dura matter of the lumbar spine.

Necropsy, histopathology and immunohistochemistry revealed a mesenchymal cell mass admixed with inflammatory cells. The pathological diagnosis of an extradural IMT with a multifocal presentation was made.

IMT is a rare lesion composed of myofibroblastic cells admixed with various inflammatory cells including lymphocytes, plasma cells, neutrophils, and histiocytes. There is continued debate in veterinary medicine as to whether these represent true neoplasia or inflammation or a mixture of both, but the pathogenesis is not fully understood; this is reflected in the confusing naming convention (IMT,

inflammatory pseudotumor, etc.). Various anatomic locations have been described but when present in the vertebral canal it can result in spinal cord compression.

There remains a question whether the multifocal presentation could have represented metastasis which has not been previously described in this location. Although rare, IMT could be included in the differential diagnosis for multifocal spinal tumors in young dogs.
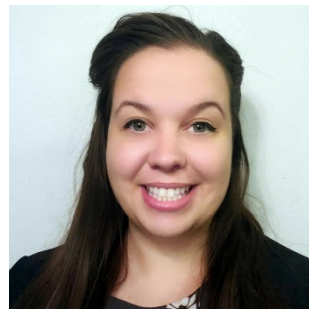
Presenter: Random Bolda

Identifying pathways of entry of ASF into sows farms and potential improvement in biosecurity to prevent viral entry

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Keywords: ASV; swine; biosecurity

Abstract

Introduction: African Swine Fever (ASF) is an economically significant virus that can lead to high morbidity and mortality. The goal of this study was to identify biosecurity gaps to reduce outbreaks of ASF in Asia. Data was collected via a survey based on questions from the infected and not infected farms using the instrument developed for the Swine Health Information Center funded Rapid Response Program and adopted for ASF virus.

Materials and methods: Seven major categories were examined on an individual production level including swine movement, pickup and deliveries, people movement, pork/food product entry, manure

removal, domestic/wild animals and insects, and the air/water. Each major category was then broken down into several subcategories, and these subcategories rated on a scale of 0.00 to 1.00 with 0.00 being areas in which there is least risk and 1.00 being the most vulnerable (high risk) to the introduction of ASF virus to the sow farms.

Results and discussion: The subcategory results from completed surveys were then ranked as higher risk (>0.50) and lower risk (≤0.49) and compiled into reports that highlighted areas that would most benefit from specific biosecurity actions to reduce the risk of a farm introducing ASF to its herds. The top five shared risks to the spread and introduction of ASF on the farms included entry of water, replacement animals import and testing, equipment used by on-farm employees, semen testing and handling, and sanitary transportation.

Presenter: Darby Toth

Association between hypercalcemia and iliosacral lymph node metastasis in dogs diagnosed with anal sac Adenocarcinoma

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Keywords: hypercalcemia; lymph node metastasis; anal sac adenocarcinoma

Abstract

Objective: To determine if elevated total serum calcium level is associated with iliosacral lymph node metastasis in dogs diagnosed with anal sac adenocarcinoma (ASACA).

Animals: Sixty-one client owned dogs diagnosed with ASACA.

Procedures: Medical records of a single referral hospital were searched to identify dogs examined between 2011 and 2021 that had a diagnosis of ASACA via cytology or histopathology. Only dogs that had serum total or ionized calcium recorded and abdominal advanced imaging performed via abdominal ultrasound (AUS) or CT were included in the study. For each dog, information extracted from the medical record included signalment and clinical and diagnostic test findings.

Results: Of the 61 dogs, 32% (20/61) had hypercalcemia, and of these, 70% had concurrent iliosacral lymph node metastasis. Hypercalcemia was significantly associated with iliosacral lymph node metastasis. However, 46% (11/24) of dogs with iliosacral lymph node metastasis were normocalcemic. Abdominal ultrasonography was specific for lymph node metastasis as 100% of sampled lymph nodes that were classified as 'likely metastatic' on ultrasound were confirmed metastatic on cytology and/or histopathology.

Clinical Relevance: Based on these results, we suggest that while the presence of hypercalcemia may increase the likelihood of concurrent lymph node metastasis, hypercalcemia alone cannot be used as a screening tool. Dogs diagnosed with ASACA should undergo full staging with either abdominal ultrasound or CT regardless of total serum calcium values. In addition, abdominal ultrasound is a valuable, specific imaging modality for the identification of iliosacral lymph node metastasis.

Presenter: Hannah Barber

Search of acaricidal bacteria for the control of the lone star tick (*Amblyomma americanum)*

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Keywords: tick; Bacillus; acaricide; bacteria

Abstract

Background: The lone star tick (*Ambylomma americanum*) is a vector of disease to animals and humans. Due to its increasing distribution throughout the Midwest and eastern United States, new control measures are needed to decrease the risk of tick-borne illnesses. Previously, we reported that ticks voluntarily drink water in natural conditions, which offers a means to deliver toxic agents (including bacteria) through the drinking behavior.

Methods: In the course of searching bacteria toxic to ticks, we tested 22 serovars of *Bacillus thuringiensis*, 4 species of *Brevibacillus*, and 4 species of *Paenibacillus* with reported entomopathogenic effects. An opportunistic pathogen, *Pseudomonas aeruginosa*, was used as the positive control with deionized water as a negative control. Bacterial inolcula were prepared by pools of 4-5 isolates per pool in sterile water. Ticks (n=8/pool) were exposed for 1 hour to a droplet of inoculum containing 2.2×10^6 CFU/mL on average.

Results: We found that an inoculum of *Pseudomonas aeruginosa* resulted in 67% mortality after 6 days of exposure. While voluntary feeding of the spore forming bacteria did not result in tick mortality, we recovered CFU/tick bacteria from dissected ticks, suggesting that the ingested bacteria could establish in the tick gut.

Conclusions: Our findings suggest the potential for colonization of some bacterial species of *Bacillus*, *Paenibacillus*, and/or *Brevibacillus*. The identification of bacteria that can colonize the tick's midgut may lead to potential field application of acaricidal bacteria for tick management through a paratrasgenic approach.

Presenter: Allyson Barksdale

Determining the stability of human coronavirus OC43 on different surfaces

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Keywords: COVID-19; Virology; Food Science

Abstract

Introduction: Scientists continue to study SARS-CoV-2 to determine the best methods to inactivate the virus on surfaces and reduce the risk of contact transmission. Human coronavirus OC43 (OC43) is a useful surrogate for SARS-CoV-2 based on its genetic similarity and BSL-2 classification. Two meat industry surfaces were inoculated with OC43 and sampled at timepoints that reflect standard industry timelines for sanitation to determine if virus was detectable.

Methods: OC43 was propagated on human ileocecal colorectal adenocarcinoma cells (HRT-18). Stainless steel grade 316 (SS) and polyethylene (poly) coupons were inoculated with 2.5 x 10^5 TCID$_{50}$ virus in in triplicate. Coupons were rinsed with beef extract buffer pH 7.0 at 0, 1, 4, 8, and 16 hours post inoculation (hpi). Infectious virus was quantified by indirect immunofluorescence TCID$_{50}$ assays on HRT-18 cells in duplicate, and percent recovery calculated.

Results: Mean percent recovery of OC43 from SS and poly at 0 hpi was 144% and 90%, respectively, and 72% and 31% at 4 hpi. The lowest percent recovery for SS was 15% at 8 hpi and 7% for poly at 16 hpi. Titers statistically different from 0 hpi were not achieved until 8 hpi on both surfaces.

Conclusion: Infectious OC43 is still detectable on surfaces at 16 hpi. The maximum observed decrease was 261,000 virions at inoculation to 18,300 virions at 16 hpi. A significant amount of virus remains, but without the knowledge of virus transfer and transmission requirements, it is difficult to interpret this data. Similar experiments with SARS-CoV-2 are currently underway

Presenter: Nicole Cassale

Autologous biologic therapies for treatment of full thickness cutaneous wounds in horses

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Keywords: Stem cells, wounds, equine

Abstract

Full thickness cutaneous wounds are a leading cause of morbidity in horses in the United States. Horses have delayed inflammatory responses, especially on the distal limb, leading to improper wound healing. Previous studies have shown that autologous biologic therapies such as platelet-rich plasma (PRP) and platelet-rich fibrin (PRF) are inexpensive treatments that may be critical to wound healing and preventing chronic wounds. We hypothesized that autologous biologic therapies would enhance wound healing in horses compared to untreated wounds. In this randomized controlled experimental study, twelve full thickness cutaneous wounds, 2.5 cm x 2.5 cm, were created on six horses (six distal limb wounds and six gluteal wounds). Wounds were randomly treated with PRP, PRF, aMSC, PRF+aspirate, PRF+aMSC+aspirate, and an untreated control. Wounds were then sampled via 6 mm punch biopsy day 0, 7, 14, 21, and 28 and the tissue was prepared for histopathology evaluation and RT-qPCR gene expression of HPRT1, COL1A1, COL3A1, and TGF-β, a housekeeping gene and three major genes involved in the healing process, respectively. Histopathologic evaluation of the wounds showed no significant difference in epithelialization, fibrosis, or inflammation between control and all treatment groups. Although histology results did not support the hypothesis that autologous biologic therapies would improve wound healing, the results from RT-qPCR gene expression analysis are pending.

Presenter: Walter Meyers

Stance analysis and activity tracking in six dogs with spontaneous osteosarcoma undergoing palliative radiation therapy-preliminary study

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Abstract

Osteosarcomas are a painful bone cancer affecting large dog breeds today. Palliative radiation therapy (RT) can be used to alleviate pain when surgical removal of the affected bone is not elected. Although RT has been proven to increase a dog's survivability and quality of life (QOL) with pain control, a method to quantify and assess their pain has yet to be established. Pain assessment by weight distribution analysis using a Stance Analysis platform (SA) and activity tracking by accelerometer (FitBark 2) data propose potential methods of effectively measuring patients' pain level. Six dogs with osteosarcomas affecting a front limb undergoing RT were enrolled in the prospective study. Minute by minute activity data were collected by attaching FitBark monitors to dogs' collars. The weight distribution data were collected prior to each radiation treatment and after RT was completed. Measurements were averaged and used to calculate a symmetric index. Changes in weight distribution and daily activity were graphed to visualize via RStudio. Among these six dogs immediate pain control by RT was assessed by SA which showed 3 positive pain control and 3 stable pain level. Most patients tended to follow a trend of having a better QOL with pain control post RT but then slowly decline over time. As a preliminary study, these trends showed to offer objective assessments of pain control and improved QOL. FitBark and SA provided complimentary data to assess patients' QOL in response to RT.

Presenter: Joel Nelson

Effects of steroid implants and differing tall fescue endophyte (*Acremonium coenophialum*) levels on cattle

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Keywords: Fescue; cattle; cortisol

Abstract

The endophyte (*Acremonium coenophialum*) commonly infecting tall fescue costs the American cattle industry up to 2 billion dollars annually. The endophyte is known to cause decreased weight gain, increased body temperature, and retained hair coat. The objective of this study was to determine if there is a difference in the toxic effects in cattle treated with different types of growth-promoting implants and grazing differing levels and types of endophyte infected tall fescue. We hypothesized that cattle grazing endophyte-free and novel-endophyte tall fescue will have better growth performance and lower body temperature than cattle grazing low- or high-endophyte tall fescue, and that growth implants will modulate the endophyte effects. To execute this study, sixty-four growing steers were used in a multi-factorial study to investigate 4 levels of endophyte: K31 high endophyte (HIGH), K31 low endophyte (LOW), endophyte free (Free), novel endophyte (Novel) tall fescue and 4 implant treatments: no implant (NO), Ralgro (Ral), Revalor-G (RG), and Synovex One Grass (SOG), and 2 legume treatments: no legumes and clover. When analyzing ADG to day-84, we found an interaction between endophyte type and implant (P<.01). We identified interactions among endophyte type and implant type that impacted ADG, and hair length, but not cortisol. We found that cattle grazing high endophyte fescue showed slower growth and longer hair length, whereas cattle grazing Free, LOW, and Novel endophyte

showed fewer negative effects. In the first 84 days, this study did not identify a consistent effect of growth implant on ADG across types of tall fescue.

Presenter: Shannon O'Day

Protective efficacy of the conditionally licensed bovine anaplasmosis vaccine against homologous or heterologous strain challenge

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Keywords: *Anaplasma marginale*; anemia; immunization; percent parasitized erythrocytes; tick-borne disease

Abstract

Background: Bovine anaplasmosis is an endemic tick-borne disease that causes significant economic loss to the U.S. cattle industry. Long-term use of antimicrobials is the primary management strategy to control active anaplasmosis. To improve antimicrobial stewardship, alternative anaplasmosis management strategies are sought. Currently, a USDA conditionally-licensed anaplasmosis vaccine is available; however, no efficacy data are available. As numerous *Anaplasma marginale* strains exist in the U.S., the objective of this study was to evaluate the protective efficacy of the conditionally-licensed anaplasmosis vaccine against homologous or heterologous strain challenge and we hypothesized the vaccine would have greatest protective efficacy against homologous strain challenge.

Methods: Ten anaplasmosis-negative, 3-month-old Holstein steers were immunized with the conditionally-licensed anaplasmosis vaccine and boosted 28-days later, and 8 age-matched unvaccinated calves served as controls. Twenty-nine days post-boost, an equal number of calves in each group were IV-challenged with a vaccine-homologous or heterologous *A. marginale* strain. Infection status and disease progression was monitored using cELISA, PCR, percent parasitized erythrocytes (PPE), and packed cell volume.

Results: Development of anemia was similar for both immunized (mean ±SEM PCV nadir = 19.05% ±0.8043) and non-immunized (mean ±SEM PCV nadir = 19.38% ±0.82) steers (p-value 0.783) with no strain-associated differences. Peak PPE was also similar for both immunized (mean ±SEM PPE peak =

4.30% ±0.57) and non-immunized (mean ±SEM PPE peak = 4.94% ±0.53) steers (p-value 0.783) with no strain-associated differences.

Conclusions: Under the conditions of this study, calves immunized with the conditionally-licensed anaplasmosis vaccine developed clinical anaplasmosis similar to unimmunized controls.

Presenter: Morgan Phillips

Prevention of Swine Influenza A viral infection by water extract from *Euglena gracilis*

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Keywords: *Euglena gracilis*; Antiviral Immunity; Influenza A.

Abstract

Euglena gracilis (*E. gracilis*) is a single-celled and flagellated microalga. This alga has been used as a dietary supplement for its nutrient-rich properties. It has been reported that *Euglena* has antiviral properties. However, the identity of the bioactive substances and the mechanisms by which *Euglena* inhibits viral infection have not been rigorously studied. Accordingly, the antiviral function and immunomodulatory effects of a putative antiviral agent partially purified from *E. gracilis* was evaluated in cell culture systems. To test its ability to directly inhibit viral infection in respiratory epithelial cells, an assay system using A549 human lung adenocarcinoma cells (model cells for lung epithelial cells) and mouse adapted porcine H1N1 influenza A virus (pH1N1 IV) has been developed. Uninfected A549 cells that were not treated with *E. gracilis* water extract (EWE) served as a control for this assay. Results indicated that a low concentration of EWE directly inhibited pH1N1 IV infection-induced growth inhibition of A549 cells. To examine the effect of EWE on cellular immunity against influenza virus infection, murine NK cell-induced lysis of pH1N1 IV-infected A549 cells was analyzed in a co-culture system with A549 cells and NK cells by a flow cytometry in the presence or absence of EWE. This study indicated that EWE significantly enhanced cell lysis function by NK cells. These experiments suggest that *E. gracilis* can inhibit pH1N1 IV infection directly as well as indirectly by stimulating NK cell-induced death of virally infected lung epithelial cells. The current study revealed that *E. gracilis* contains a potential antiviral agent.

Presenter: Samantha Rice

Antimicrobial activities of cannabinoids against bacterial pathogens that cause liver abscesses in feedlot cattle

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Keywords: cannabinoids, antimicrobial activity, liver abscess, feedlot cattle

Abstract

Liver abscesses in cattle, a consequence of feeding high-grain diets, have a significant economic impact on the feedlot industry. The etiologic agents of liver abscesses include two subspecies of *Fusobacterium necrophorum* such as *necrophorum* and *funduliforme, Trueperella pyogenes,* and *Salmonella enterica.* Tylosin is the most widely used antibiotic to reduce the incidence of liver abscesses. Because of concern with antimicrobial resistance, research is needed to seek antibiotic alternatives for the control of liver abscesses. Industrial hemp or *Cannabis sativa* plants, containing cannabinoids, have nutritional and potentially therapeutic values as a feed source in livestock. Among the cannabinoids present, cannabidiol (CBD) and cannabidioloic acid (CBDA) are the major components. Our objective was to investigate antibacterial activities of CBD and CBDA against pathogens involved in liver abscesses of cattle. The antibacterial activities of CBD and CBDA were determined by disc diffusion, micro-broth and macro-broth dilution methods. Growth was measured using spectrophotometer after 24 hours for *Salmonella* Lubbock and 48 hours for *T. pyogenes, Fusobacterium* subspecies. In the disc diffusion method, bacterial inoculum was spread-plated on blood agar, sterile discs inoculated with 25 μL of CBD or CBDA were placed. Blood agar plates were incubated and zone of inhibition was measured. The

micro-broth dilution method tested CBD and CBDA at concentrations of 100, 50, 25, 12.5, 6.25, 3.125, 1.56, 0.78, 0.39, 0.195, and 0.098 μg/mL. CBD and CBDA inhibited *T. pyogenes,* but not *Fusobacterium* and *S. enterica*. Further investigations of the antimicrobial effects of CBD and CBDA are in progress.

Presenter: Harith M. Salih

Evaluation of antimicrobial activities of phytophenols against liver abscess causing pathogens in feedlot cattle

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Keywords: Liver abscess; Feedlot cattle; Phytophenols; Antibiotic Alternatives

Abstract

Liver abscesses, which occur in finishing cattle fed high-grain, low-roughage diets, are of significant economic concern to the feedlot industry. The causative agents include two subspecies of *Fusobacterium necrophorum* (*necrophorum* and *funduliforme*), *Trueperella pyogenes*, and *Salmonella enterica*. Tylosin, a macrolide antibiotic, is supplemented in the feed to reduce liver abscesses. However; the concern for the emergence of antimicrobial resistance, has necessitated the need to find antibiotic alternatives. Plant based phenolic compounds are known to have antimicrobial activities, therefore, have the potential to be antibiotic alternatives.

We investigated the efficacy of phytophenol compounds extracted from black and sumac sorghum, grape seed, green tea, matcha tea, and yerba mate on liver abscess-causing bacterial pathogens. Phenolic compounds were extracted with 75% aqueous acetone as a solvent. Total phenolic content was

determined using spectrophotometer. Bacterial strains were cultured in Muller-Hinton broth (for *S. enterica* and *T. pyogenes)*, anaerobic brain heart infusion broth (for *Fusobacterium)* with and without phenolic extracts (1 mg/ml). Growth measured at 24 and 48 hours by determining bacterial concentrations. Micro-broth dilution method was used to quantify the inhibition of phytophenolic compounds.

Black and sumac sorghum, grape seed, green tea, yerba mate and matcha tea phenolics inhibited the growth of both *Fusobacterium* subspecies, *T. pyogenes* and *S. enterica*. Phytophenol were inhibitory against *T. pyogenes* with minimum inhibitory concentration ranging from 6.25-12.5 µg/ml.

Further studies are ongoing to investigate different concentrations and stability of these phenolic compounds.

2022 Phi Zeta Research Day
College of Veterinary Medicine
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Presenter: Sarah Timmerman

Using microwave ablation therapy on aldosterone-producing adenomas to eliminate hyperaldosteronism

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Keywords: ablation; thermometry; aldosteronism

Abstract

Aldosterone-producing adenomas are benign adrenal tumors responsible for half of primary aldosteronism cases. Standard care for unilateral disease is adrenalectomy, but bilateral disease requires medical management with significant side effects. Targeted microwave ablation may destroy the adenomas while sparing healthy tissue leading to better outcomes. 12 nude mice (nu/nu) were

injected subcutaneously with 6 million HAC15 cells and allowed to grow to 5 mm. Mice were separated into test and control groups. Both groups were anesthetized but only the test group was ablated. A 14 Tesla MRI was used to align an experimental microwave probe and monitor volumetric temperature profiles during ablation (defined as 55°C as measured at 4 points within the tumor by MRI thermometry). 24 hours post-ablation, angiotensin II injections were given to stimulate aldosterone production, and blood was collected 4 hours later, post-euthanasia. The tumor was harvested, stained with TTC and H&E, and analyzed blindly by pathologists. TTC viability stain suggested that 5/6 mice were successfully ablated. Blinded verification by H&E stain indicated that of the 6 ablations: 4 were complete, 1 was partial, and 1 was unsuccessful, likely due to poor targeting. Results show that when treated with microwave ablation at a temperature of at least 55°C for one minute, the tumors are successfully ablated resulting in complete necrosis. Recent work has demonstrated that using 20 million HAC15 cells with matrigel as a cell-matrix has led to a more homogenous HAC15 tumor model that will be used for future studies.

Presenter: Zachary White

Sex Differences in the Relationship between Exercise and the Brain

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Keywords: Exercise, Brain, Sex differences

Abstract

Introduction: Exercise is an effective, non-pharmacological therapy to promote brain health. Sex differences in cognitive changes through the lifespan and in adaptations to exercise training are documented, yet more information is needed to characterize these disparities. We hypothesized that aerobic exercise training would improve memory, coordination, and muscular strength in female but not male rats.

Methods: Thirty-two Fisher 344 animals (16 males) were housed 2 per cage, on a 12:12 light:dark cycle with food and water ad libitum. At two months old, following a 1-week acclimatization period where the non-compliant runners were identified, they were randomly assigned to sedentary or exercise training groups. The exercise training group completed a 10 week treadmill training protocol. The protocol was administered during the animal's dark cycle and increased from 15 cm/s for 15 minutes to 35 cm/s for 60 minutes. The sedentary group was restricted to cage activity. Memory (Morris water maze), coordination (Rotarod), and muscular strength (grip strength) were assessed following the exercise intervention.

Results: A significant exercise training effect was seen in females. Female runners showed greater performance in the Morris water maze (9.2 vs 32.7s, $p<.05$) and in the Rotarod (69 vs 47.5s, $p<.05$). No significant training effect was documented in the male groups. No training effect was documented in grip strength in females or males.

Conclusion: Memory and coordination improvements resulting from aerobic exercise training were seen in female but not male rats. This work adds to existing literature which investigates sex differences in cognitive health and exercise training adaptations.

The Sigma Chapter of the Society of Phi Zeta wishes to acknowledge and thank our volunteer moderators and judges for the 2022 Phi Zeta Research Day.

Judges for Basic Science Research oral presentations:
Roman Ganta, moderator; Erin Schirtzinger, Bruce Schultz, Andrew Curtis, judges

Judges for Applied/Clinical Science Research oral presentations (Small animals/exotics):
Katie Delph, moderator; Katherine KuKanich, Sarah Kaufman, David Upchurch, Stephanie Martinez, judges

Judges for Applied/Clinical Science Research oral presentations (Large animals):
Matthew Basel, moderator; Ronnie Elmore, Haileigh Avellar, Matthew Basel, judges

Judges for Basic Science Research posters:
Jeba Jesudoss Chelladurai, Chieko Azuma, judges

Judges for Applied/Clinical Research posters:
Raghavendra Amachawadi, Nicky Cassel, judges