

## VetMed Research Scholars 2025

### Evaluating the Impact of Strongyle Parasites on Health in Beef Calves Entering Stocker Programs in Mississippi

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The objective of this study was to evaluate the impact of strongyle-type gastrointestinal parasites on the health of calves entering stocker operations. Blood and fecal samples were collected from 292 calves entering four privately-owned stocker operations in Mississippi at or shortly after the time of arrival. Demographic information (e.g., weight, lot size, etc.) and health interventions (e.g., vaccination, etc.) were also obtained. Fecal samples were assessed quantitatively using the Modified McMaster Test to determine fecal eggs per gram (FEPG). Serum cortisol, haptoglobin, and TNF $\alpha$  were analyzed from blood samples. Outcomes of interest included FEPG at arrival, morbidity, and days to first treatment. Data were analyzed using linear mixed model regression and logistic regression generalized linear mixed models as appropriate for outcome variable type, with lot within site included as a random variable. Average calf weight on arrival was 651 lbs. in Feb., 560 lbs. in March, 520 lbs. in April, 456 lbs. in May, and 475 lbs. in June. Average calf FEPG at arrival was 750epg; median: 350epg; ranging from 0epg - 19,850epg. Fecal eggs per gram were dependent on month ( $p < 0.01$ ) with crude mean FEPG per month being 76epg in Feb., 473epg in March, 257epg in April, 611epg in May, and 1,407epg in June. Overall, morbidity was 10.4%, overall mortality was 1.03%, and the case fatality rate was 9.7%. The average time for the first treatment was 15.5 days. Whether or not a calf required treatment for bovine respiratory disease and days to first treatment were not found to be associated with fecal egg per gram in calves at arrival to stocker operations ( $p = 0.13$ ;  $p = 0.93$ ).

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### Ionic Liquid Coating Facilitated by Polydopamine for Disruption of *S. aureus*

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Osteomyelitis is a common concern following orthopedic surgeries, with treatment failure rates for standard-of-care antibiotics between 10% and 40%. These high rates of treatment failure can often be attributed to the formation of antibiotic-resistant *Staphylococcus aureus* biofilms on orthopedic implants. One way to mitigate the risk of developing antibiotic resistance is by using an alternative to antibiotics, such as choline based ionic liquid (IL), as a coating for orthopedic implants. ILs are a unique biomaterial that can provide a broad spectrum of antimicrobial effects based on their carbon chain length by disrupting microbial cell membranes to stimulate cell death. We have shown that ILs effectively kill *S.*

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*aureus* biofilms. Herein, through planktonic assays, we determined that the 12-carbon chain IL was the most effective at killing *S. aureus*. Further, our lab previously showed that polydopamine (pDA) can effectively facilitate coatings onto biomaterial substrates. Our current hypothesis is that by leveraging pDA to facilitate the coating of ILs on stainless steel coupons (orthopedic implant material), *S. aureus* growth would be disrupted. To test this, we developed a protocol for coating the pDA + IL solution onto stainless steel coupons and confirmed the presence of the coating with SEM-EDX and water contact angle. Preliminary results of the coating against planktonic *S. aureus* indicate modification of the coating is needed for improved antimicrobial efficacy. Long-term, the IL + pDA coating on orthopedic implants is expected to reduce the risk of osteomyelitis in orthopedic surgery, preventing the development of antibiotic resistance to *S. aureus*.

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### **Analysis of Brucellosis in Perinatal Common Bottlenose Dolphins (*Tursiops truncatus*) in the Mississippi Sound**

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*Brucella ceti* is a gram-negative bacterial pathogen that causes brucellosis in marine mammals, particularly cetaceans. Common bottlenose dolphins are a susceptible species that is native to the Mississippi Sound (MSS). Five sequence types (STs) have been identified in marine mammal *Brucella*, with ST27 causing disease in cetaceans and having zoonotic potential. In the MSS in 2024, there were eleven positive cases of *B. ceti* out of twenty-one cases tested via PCR. In the beginning of 2025 (February-April), there was a significant uptick in strandings and positive cases, with seventeen positive cases out of thirty-four cases tested via PCR. These seventeen positive cases were all perinatal dolphins. We hypothesized that recent cases of brucellosis in perinatal common bottlenose dolphins in the MSS are associated with a specific *B. ceti* ST that produces characteristic pathological lesions and causes high mortality. PCR, cloning, and sequencing were performed on *B. ceti*-positive tissues from stranded/deceased perinatal common bottlenose dolphins in the MSS from January 2024 through April 2025. Sequence analysis of genes *glk*, *trpE*, *omp25*, *omp2a*, and *omp2b* was conducted, and phylogenetic trees were constructed for each gene to determine strain relatedness. Fourteen of the seventeen positive 2025 cases were ST27. *Omp2a* and *omp2b* better differentiated STs than the other genes. Histopathology was used to assess correlations between specific lesions and ST. Common histopathological findings included bronchopneumonia, dermal perivascular inflammation, and less commonly, meningoencephalitis and polyradiculoneuritis. Future studies using culture-based methods are recommended to improve the quality of strain comparisons.

Funding Sources: Boehringer Ingelheim and Mississippi State University, College of Veterinary Medicine, Office of Research and Graduate Studies

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### **Describing and Quantifying the Secondary Epidermal Lamellar Tilt Angle within the Equine Hoof**

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Laminitis is a debilitating equine hoof disease characterized by disruption of the lamellar interface supporting the distal phalanx (P3), often resulting in mechanical instability, pain, and lameness. While previous research has explored cellular dynamics and differing growth patterns between hoof wall layers, the biomechanical role of lamellar orientation remains poorly understood. This study aimed to describe and quantify tilt angles within the secondary epidermal laminae (SEL) and assess their potential contribution to frictional resistance and structural suspension of P3. Using micro-computed tomography (MicroCT), lamellar structures from one equine hoof were segmented into superficial, middle, and deep zones. These tilt angles were measured across 14 PEL using DragonFLy and ImageJ software. Results revealed a progressive increase in tilt angle from superficial ( $48.78^\circ$ ) to middle ( $50.88^\circ$ ) to deep ( $57.47^\circ$ ) regions, supporting a proposed “Stick-Slip” mechanism wherein smaller angles promote adhesion and larger angles facilitate controlled slippage. These findings align with prior hypotheses and frictional models, including lamellar trapping and interleaved fiber resistance. Limitations include image resolution and lack of chemical fixation, suggesting future studies should incorporate contrast-enhanced imaging and expanded datasets. Ultimately, quantifying lamellar tilt angles along with other parameters of friction may offer new insights into laminitis pathophysiology and help improve diagnostics and therapeutic strategies aimed at preserving hoof integrity.

Funding Sources: Boehringer Ingelheim and Mississippi State University, College of Veterinary Medicine, Office of Research and Graduate Studies

### **Disruption of bacterial biofilms using antibiotic loaded poloxamer 407 gel**

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Chronic soft tissue infections involving biofilms are difficult to treat due to the resistance of systemic antibiotics. Biofilms often require antimicrobial minimum inhibitory concentrations 100-1,000 times higher than planktonic bacteria, making systemic delivery unsafe or ineffective. Poloxamer 407 (P407) is a thermoreversible hydrogel that facilitates topical delivery of high concentration antibiotics. This study aimed to evaluate the effects of antibiotic loaded P407 gel on in vitro biofilm thickness and structure using confocal microscopy. We hypothesized that antibiotic/P407 gel would disrupt biofilm growth and reduce thickness more than gel alone or no intervention. Biofilms of *Enterococcus faecium* and *Staphylococcus aureus* from clinical canine wound isolates were grown on polycarbonate coupons at  $37^\circ\text{C}$  for 72 hours. For treatment, 25% P407 gel was compounded with 20 mg/ml vancomycin (*E. faecium*) or 50 mg/ml (*S. aureus*). Each strain was tested with antibiotic gel, gel alone, and (*S. aureus* only) left untreated. Confocal microscopy was used to image biofilms at regular intervals. All treated biofilms significantly decreased in thickness over time. There was a significant difference in thickness between *E. faecium* groups at 4 hours only. There was no significant difference in thickness between *S. aureus* gel groups at any time, but there was a significant difference in thickness between the untreated group and both gel groups at 12, 16, 24, 26, 72 hours. Methods may have affected some results due to biofilm damage while imaging. P407 gel

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offers an effective system to manage biofilm-related infections by delivering localized, high-concentration antibiotic therapy that aligns with antimicrobial stewardship principles.

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### **Impact of glyceric acid supplementation on boar semen quality and uric acid stability during prolonged storage**

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Fertility is crucial to the food animal industry, relying on methods such as artificial insemination for safety, management, and improving genetics. Boar sperm are susceptible to oxidative stress and damage during storage. The purpose of this study is to understand how to increase the survivability during storage along with predicting boar semen quality from day 0. This study investigated the potential of glyceric acid (GA) to enhance boar semen storage. Uric acid (UA) was evaluated as a potential predictor of sperm quality. Semen from 12 boars were divided into four equal aliquots and treated with GA at 0  $\mu$ M (control), 5  $\mu$ M (GA1), 10  $\mu$ M (GA2), and 100  $\mu$ M (GA3) before stored at 17°C for 7 days. Semen quality was analyzed on day 0 using a computer-assisted sperm analyzer (CASA system, IMV Technology), noting total motility (TM), progressive motility (PM), and normal morphology (NM). Repeated-measures ANOVA with  $P < 0.05$  was used for data analysis. As to be expected, semen quality decreased during storage. With the addition of GA1, no significant increase in TM, PM, or NM was noted. GA2 had a trend of improved PM ( $P=0.06$ ), while both GA2 and GA3 decreased NM when compared to the control. Levels of UA were stable during storage from day 0 to day 7, but had non-significant correlations to TM, PM, and NM. In conclusion, GA supplementation may not be beneficial to boar sperm preservation, and UA does not seem to be a predictor of sperm quality. In future research, utilization of other metabolites in stored semen should be analyzed. Likewise, other markers of quality should be tested.

Funding Sources: National Institutes of Health T35OD010432 (pending) and Mississippi State University, College of Veterinary Medicine, Office of Research and Graduate Studies

### **Detection of *Streptococcus* and *Aeromonas* spp. from Bottlenose Dolphins in the Mississippi Sound**

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Freshwater exposure poses a significant health threat to common bottlenose dolphins (*Tursiops truncatus*), causing notable skin lesions, corneal edema, electrolyte imbalances, and death. Although the clinical signs and outcomes of prolonged freshwater exposure are documented, the underlying pathogenesis – particularly the role of bacteria in lesion development – remains poorly understood. This project focuses specifically on determining whether *Streptococcus* or *Aeromonas* species are involved in

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lesion development. To date, there is no available data on bacteria contributing to the development of these lesions, so this project investigated whether *Streptococcus* and *Aeromonas* are associated with skin lesions. To test this, PCR was used to detect the presence of *Streptococcus* and *Aeromonas* genomic DNA in dolphin skin samples, and gel electrophoresis was employed to confirm the results. PCR-positive products were purified and sequenced to determine relatedness of strains. Phylogenetic trees were developed using MUSCLE, IQTREE, and ITOL. Our results showed that there was no consistent presence of *Aeromonas* in the samples. *Streptococcus* was detected in ten of the dolphin samples. However, phylogenetic trees showed genetic variation between the strains with potentially multiple streptococcal strains involved. In conclusion, it is possible that *Streptococcus* contributes to pathogenesis of freshwater lesions in some cases, but the detection of genetic variation between strains suggests streptococcal involvement as an opportunistic pathogen.

Funding Sources: Boehringer Ingelheim and Mississippi State University, College of Veterinary Medicine, Office of Research and Graduate Studies

### **Comparative Analysis of Pressure-induced Wound Healing in *Ces1d* Knockout and Wild-type Mice**

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Diabetic foot ulcerations (DFU) in patients with type 1 or type 2 diabetes mellitus (T1D or T2D) have been described to be a result of hyperglycemia, neuropathy, and peripheral vascular disease. Research shows that about 80% of patients with DFUs will eventually need lower leg amputations. Of these 80%, there is about 50% survival rate 5 years after the procedure. Researchers have looked at carboxylesterase (*Ces1d*) for its roles in xenobiotic metabolism, endobiotic metabolism, inflammation through macrophage activity, and protein regulation in the endoplasmic reticulum. Although carboxylesterase's role in inflammation is still widely unknown, it does seem to play a part. This study looks at the impact of *Ces1d* on dermal wound healing in non-diabetic animals to establish the baseline function of *Ces1d* in the absence of metabolic disease. Our overall hypothesis was that the loss of *Ces1d* in mice would be beneficial to wound healing in part due to the metabolic differences, which would occur in a sex-dependent manner. Pressure-induced wounding models were used in *Ces1d* knockout (*Ces1d*KO) and wild-type (WT) mice to replicate chronic wound development. Two magnet cycles were used to create these wounds. Pictures of the mice were taken from day 1 to day 14, then measured using ImageJ software. Unlike the WT mice, the *Ces1d*KO males had larger initial wounds while the *Ces1d*KO females had delayed wound resolution on day 8. There was a significant change in body weight between WT and *Ces1d*KO males, with a decrease in body weight of the *Ces1d*KO males from 2 days prior to wounding and 18 days post wounding. To conclude, there seems to be sex-dependent differences between *Ces1d*KO and WT mice in pressure-induced dermal wound healing.

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### Efficacy of Anti-Fel d 1 Nanobody for Reducing Human Allergic Responses to Cats

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Approximately 20% of U.S. adults are sensitive to cat allergens, posing challenges for cat owners and animal workers. The primary allergen, *Felis domesticus* 1 (Fel d 1), is a small glycoprotein secreted by cats' salivary, sebaceous, and anal glands. It causes sensitization in over 90% of cat-allergic individuals by binding to IgE receptors on mast cells, triggering inflammatory mediators and symptoms ranging from rhinitis to asthma or anaphylaxis. To disrupt this response, we evaluated the use of nanobodies to block IgE binding. Nanobodies are single-domain heavy-chain antibodies known for their small size, high stability, and strong binding capabilities. The aim of this study was to assess nanobodies' ability to block the IgE epitope on the allergen and reduce free Fel d 1. This in vivo pilot study enrolled eight domestic cats. Owners collected saliva samples using Salivette® kits over three baseline days. A 1 ml nanobody solution (1 mg/ml) was then administered daily, followed by sample collection approximately eight hours post-dose for 14 days. In total, 17 saliva samples were collected per cat. Fel d 1 levels were quantified using ELISA. Seven cats completed the protocol. Baseline Fel d 1 levels were analyzed by age, sex, and breed. No significant differences were observed by sex. After treatment, all cats showed reduced free salivary Fel d 1 levels, with reductions ranging from 21.7% to 75.7%. Male cats had a higher average reduction than females (54.1% vs. 21.0%). This study shows that oral nanobody administration reduced the level of salivary Fel d 1 binding to IgE without adverse effects. Further research is needed to optimize dosing and evaluate clinical outcomes in allergic individuals.

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### Investigating Factors Associated with the Presence of Horseflies (Tabanids) on Cow-Calf Operations in Mississippi

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Our research group is interested in using trapped tabanids {horseflies} as test samples for bovine anaplasmosis. The objective of this study was to determine the conditions affecting the greatest number of trapped flies. Our hypothesis was that weather and management conditions might predict fly numbers. Flies were collected using an H-trap on 17 farms over 7 weeks, with each deployment lasting 24 hours. Maximum temperature, minimum temperature, precipitation the day before and precipitation the day of were recorded from the National Oceanic and Atmospheric Administration, using the weather station closest to the location of each farm. Surveys were used to collect data on management practices and ecological characteristics of the farms. A Poisson regression repeated measures model was created using manual forward variable selection. The model accounted for repeated measures of farms. Alpha was 0.05. No tabanids were caught in 38% of 116 trapping events. On the days when tabanids were caught, there was an average of 4.99 tabanids per trap event. The number of tabanids collected was associated with the minimum temperature on the day of trap removal {Rate Ratio [RR] = 1.1024},

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precipitation on the day before set up {RR = 0.9388}, and precipitation on the day of set up {RR = 0.9684}. No survey variables were significant predictors of tabanid counts. To maximize tabanid capture H-traps should be deployed when nighttime temperatures are warmer and when there is no precipitation on the day of or the day prior to trap set up.

Funding Sources: National Institutes of Health T35OD010432 (pending) and Mississippi State University, College of Veterinary Medicine, Office of Research and Graduate Studies

### **A Comparison of 2-view and 3-view Abdominal Radiography in the Diagnosis of Small Animal Small Intestinal Foreign Body Obstruction**

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Small intestinal foreign body obstructions account for approximately 80% of all mechanical intestinal obstructions in dogs (Mullen et al., 2020). These obstructions, if left untreated for a long length of time, have been shown to lead to an 85% mortality rate due to intestinal damage (Mullen et al., 2020). Linear foreign bodies are also a major concern because they have a greater risk for perforation of the intestines and subsequent sepsis, making accurate diagnosis imperative as well (Mullen et al., 2020). The current protocol for suspected small intestinal obstruction remains a two-view radiographic series in veterinary practices, consisting of a ventrodorsal view and right lateral view (Mavromatis et al. 2018). If the additional abdominal radiograph is shown to increase the accuracy of the clinical diagnosis, it would decrease the need for unnecessary surgical intervention in the case of a non-obstructive foreign body. In this retrospective comparison study, a series of both 2-view and 3- view abdominal radiographs of 285 canine cases and 38 feline cases with a known outcome were reviewed by two blinded board-certified radiologists. The statistical analysis of the 2-view had a sensitivity (Sn) of 72%, a specificity (Sp) of 79%, a positive predictive value (PPV) of 92%, and a negative predictive value (NPV) of 46%. The 3-view statistical analysis had a Sn of 84%, a Sp of 83%, a PPV of 94%, and a NPV of 61%. The NPV shows that the additional radiographic view leads to a higher accuracy of diagnosing a non-obstructive foreign body. These results lead to the conclusion that a 3- view radiograph series would help to reduce the number of unnecessary surgical interventions in suspected small intestinal foreign body obstructions.

Funding Sources: Boehringer Ingelheim and Mississippi State University, College of Veterinary Medicine, Office of Research and Graduate Studies

### **Effect of Vaccinating Cows Once at Pregnancy Check on Clostridial Antibody Titers in Calves at Branding Age**

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*Clostridium* spp. are Gram-positive bacteria known to cause disease in cattle around the world. These organisms tend to affect the young and disease is rapidly fatal. Vaccination and proper hygiene can

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mitigate the impacts of *Clostridium* spp. in cattle herds. Studies show that a two-dose vaccine regimen effectively increases antibody titers in against *Clostridium* spp. However, for large cattle farms, gathering and vaccinating cows twice can be time-consuming and costly. As a result, producers often opt to administer only a single-dose vaccination. Vaccinating cows correctly impacts the health of their calves, who depend on maternal antibodies for early life protection. The objective of this study was to determine if vaccinating gestating cows with a single dose of multivalent clostridial vaccine increases their calves' antibody titers against *C. septicum*, *C. novyi*, and *C. sordelli* at branding age. This study was conducted using cows from a single ranch. Cows in three pasture groups were randomly assigned to either the control or vaccine group. Antibody titers of the cows prior to vaccination and calves at branding were measured using a microfluidic ELISA assay; titers were expressed as percent of negative control. The preliminary analysis revealed that cows had higher antibody titers than calves. In cows, *C. novyi* titers were  $599.9 \pm 126.8$  {mean  $\pm$  S.D.}, *C. septicum* were  $302.8 \pm 58.6$ , and *C. sordellii* were  $458.3 \pm 79.1$ . In calves, *C. novyi* titers were  $189.7 \pm 56.1$  {mean  $\pm$  S.D.}, *C. septicum* were  $143.6 \pm 40.4$ , and *C. sordellii* were  $166.4 \pm 45.2$ . The titer range in cows was greater {168.1-904.1 [min-max]} than in calves {65.0-385.9}. Results of ongoing analysis will be reported at a later date.

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### Evaluating Preference and Consumption Patterns of Chlortetracycline Mineral Supplement in Commercial Beef Cows

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The objective of this study was to evaluate if preference and consumption patterns exist when feeding chlortetracycline (CTC) containing mineral supplement. Two free choice mineral supplements were offered: a positive control containing CTC (prescribed at the recommended dosage of 2 mg/lb/day) and a negative control (NO-CTC). Cows were randomly allocated to one of four pens (4 bunks per pen; 8 cows per pen). Each cow was assigned to one of two alternating 14-d treatment sequences, receiving either CTC or NO-CTC mineral supplement. Vytelle Sense Systems was utilized for meal data compilation in Microsoft Excel. On days (d) 0, 14, and 28 data was collected for body weight (BW) and body condition score (BCS). No treatment  $\times$  day or main treatment effects were detected for daily mineral intake ( $P \geq 0.53$ ) or hay intake ( $P \geq 0.41$ ) between CTC and NO-CTC cows. Performance responses detected no treatment differences for BW change ( $P \geq 0.62$ ) between CTC and NO-CTC cows. However, CTC cows tended ( $P = 0.08$ ) to have greater BCS change compared to NO-CTC cows (-0.14 vs. -0.02, respectively). Furthermore, a treatment  $\times$  day interaction ( $P = 0.02$ ) was detected on d 5 for feed bunk duration with CTC cows staying longer in the feed bunk (12,518 s) compared to NO-CTC cows (9,527 s). Similarly on d 9, CTC cows tended ( $P = 0.08$ ) to stay longer in the feed bunk (14,493 s) compared to NO-CTC cows (12,234 s). Results indicate that no preference or consumption pattern differences exist in CTC and NO-CTC containing mineral supplements. Future studies should investigate outcomes associated with significant and trending data to provide guidance on antimicrobial stewardship standards when prescribing CTC containing mineral supplements.

Funding Sources: Boehringer Ingelheim and Mississippi State University, College of Veterinary Medicine, Office of Research and Graduate Studies



### **Exosomes in Osteoarthritic Canine Stifles: A Comparative Analysis Using Raman Spectroscopy and Flow Cytometry**

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Osteoarthritis (OA) affects up to 80% of senior dogs and commonly follows cranial cruciate ligament (CrCL) rupture, which is the most common canine orthopedic injury. OA is an inflammatory condition marked by articular cartilage degeneration, osteophyte formation, and chronic joint pain. In humans, the infrapatellar fat pad (IFP) is a potent source of mesenchymal stem cells (MSCs) with high cartilage-regeneration potential. MSCs release exosomes which contain miRNAs and other macromolecules that promote anti-inflammatory and chondrogenic effects, including upregulation of genes for cartilage repair. Despite this, MSC-rich tissues like the IFP are often resected during CrCL surgeries in dogs. This study aims to optimize methods for exosome isolation and to compare flow cytometry and surface-enhanced Raman spectroscopy (SERS) for exosome identification. We hypothesize that exosome concentration will be highest in IFP compared to synovial membrane (SM) and synovial fluid (SF), and that there will be no difference between flow cytometry and Raman spectroscopy in identifying exosomes in tissue. Tissues were collected intraoperatively from dogs with naturally occurring OA undergoing CrCL repair surgery. MSCs were cultured to 80% confluency; exosomes were isolated via ultrafiltration and analyzed by flow cytometry (CD9, CD63, CD81) and SERS. Exosomes were successfully isolated from all tissues. CD9 expression was significantly higher in IFP vs. SF. Raman spectroscopy and remaining flow cytometry data remain under analysis. These results may inform future MSC-preserving surgical techniques and streamline exosome quantification methods. These results support exosomes' relevance to OA and may guide methodology for future studies.

Funding Sources: Boehringer Ingelheim and Mississippi State University, College of Veterinary Medicine, Office of Research and Graduate Studies

### **Optimization of Two Methods for Understanding how Cannabinoids are Anti-inflammatory in Canine Immune Cells**

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Cannabinoids are phytochemicals from the *Cannabis sativa* plant. Their immunomodulatory activity has been well-studied in humans and mice. Data for cannabinoid mechanisms in dogs is lacking despite an increase in the use of cannabis products to treat a variety of ailments for canines, including anxiety and immune-mediated diseases. In canine peripheral blood mononuclear cells (PBMCs), the cannabinoids cannabidiol (CBD) and delta 9-tetrahydrocannabinol (THC) have demonstrated efficacy in suppressing the secretion of cytokines, especially interferon (IFN)- $\gamma$ , associated with inflammation in a concentration dependent manner. We hypothesize that cannabinoid-mediated suppression of IFN- $\gamma$  involves suppression of transcription and disruption of metabolism. In this project we optimized

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methods for phospho-flow cytometry to analyze modulation of transcription factors and liquid chromatography mass spectrometry (LC/MS) to quantify Krebs cycle metabolites. PBMCs were isolated from canine whole blood then stimulated with phorbol ester plus calcium ionophore (P/I) to increase phosphorylation of STAT4, NFAT, and NF- $\kappa$ B. We showed specific staining of the phosphorylated transcription factors and NFAT and NF- $\kappa$ B were increased with stimulation. We also showed that Krebs cycle metabolites were increased in response to lipopolysaccharide (LPS) stimulation of canine macrophages. These results provide the foundation for future studies to determine whether the mechanism by which cannabinoids or steroids suppress IFN- $\gamma$  occurs through suppression of transcription or altered metabolism. These are some of the first studies to characterize the molecular mechanisms of immune suppression by cannabinoids in canine immune cells.

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### **Effect of Anthelmintic Treatment on Performance and Fecal Egg Count in a Mississippi Cow-Calf Herd**

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The objective of this study was to describe monthly variation in gastrointestinal strongyle parasite prevalence among cows in a northern Mississippi beef cow-calf herd, and to evaluate the impact of anthelmintic treatment method on cow health and performance. One-hundred and one Angus-Charolais cross spring-calving cows were stratified by age and body condition score (BCS) and divided evenly into four different anthelmintic treatment groups: no treatment, oral anthelmintic only, injectable anthelmintic only, and combination (oral and injectable). Cattle were enrolled in Oct. 2024 and anthelmintic treatments were applied at routine herd processing events in Oct. 2024 and April 2025. Fecal samples were collected from each cow monthly beginning Nov. 2024 through July 2025, with calves born in spring of 2025 sampled beginning June 2025. Standing fecal floats using sodium nitrate were performed within 48 hours of sample collection, and quantitative fecal egg counts (FEC) of strongyle-type ova were conducted. Data was analyzed using logistic regression generalized linear mixed models with month included in a repeated statement and pasture group assessed as a random variable. On average, 13% of cows had strongyle-type ova detected each month. For each 5-year increase in cow age, cows had 1.7 times the odds of having strongyle-type ova in feces. Cow anthelmintic treatment had no impact on calf average daily gain (ADG) from birth to June 2025 ( $p = 0.38$ ), however, for each 1-year increase in cow age, calf ADG decreased by 0.03 lbs ( $p = 0.0178$ ). Cow age, cow treatment group, and calf age in days did not impact calf FEC. In conclusion, cow anthelmintic treatment group had no effect on cow or calf performance.

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