

LSU

School of
Veterinary Medicine

**EQUINE HEALTH
STUDIES PROGRAM**

2020 Equine Research Report

Scientific studies conducted to help advance equine health and well-being

LETTER FROM OUR DEAN

The LSU School of Veterinary Medicine is pleased to present the 2020 Equine Health Studies Program Equine Research Report, which covers scientific and scholarly activities of the program from 2018 through 2020. The EHSP continues to focus on the health, well-being, and performance of horses by delivering state-of-the-art research and clinical services that benefit the horse-owning public. As the Dean of the School of Veterinary Medicine, it is an honor for me to be a part of this premier equine program.

I am impressed with the comprehensive research performed by the faculty, graduate students, house officers, and staff within this program, as evidenced by the contents of this report. Since its inception in 2005, the EHSP has been translating research into practical solutions for our broad-based constituents and clients in addition to delivering clinical services, education, and community outreach to referring veterinarians and clients.



The EHSP continues to make significant contributions to our understanding of the complex mechanisms of horses in health and disease. The EHSP collaborates with other universities, industry, and foundations to discover new treatment and preventative measures for lameness, gastrointestinal disease, endocrine disease, respiratory disease, reproductive disease, and assisted reproduction, which collectively result in a significant yearly loss of revenue to the equine industry. More specifically, EHSP faculty scientists are actively studying a number of common diseases, including osteoarthritis, laminitis, long bone fracture, gastric and colonic ulcer disease, Equine Cushing's disease, and inflammatory and allergic airway disease (summer pasture-associated obstructive pulmonary disease). Recently, the EHSP has become a Good Laboratory Practices (GLP) laboratory and completed a study which was submitted to the FDA.

The EHSP continues to build and maintain strong relationships and community engagements with Louisiana stakeholders so that it can respond to the needs of horses and horse owners. In the aftermath of the Great Flood of Baton Rouge 2016 and Hurricane Harvey, the EHSP and the LSU SVM, in concert with the Louisiana State Animal Response Team and Texas A&M University College of Veterinary Medicine, helped horses and other large animals in need by supplying personnel for search and rescue, triage of injured animals, and clinical and surgical care. The EHSP has been and continues to be on-alert to respond to the needs of horses and is a model for other veterinary institutions when it comes to emergency preparedness. Additionally, the EHSP continues to provide strong leadership and the latest information to horse owners through its continued involvement with referring veterinarians, the Louisiana State Racing Commission, the Louisiana Equine Council, the Louisiana Thoroughbred Breeders Association, the Louisiana Horse Rescue Association, and many others.

The program has always been about the people and horses and we are blessed by strong relationships with the equine community. I could not be more proud of the emergence and productivity of our EHSP as it continues to benefit horses throughout the world. I am always humbled by the dedication of our faculty and staff and their continued commitment to the mission of the EHSP and the LSU SVM. It is truly a nationally and internationally recognized program that has put the LSU School of Veterinary Medicine out in front in equine health and welfare.

Sincerely,

Joel Baines, VMD, Ph.D.

Dean, LSU School of Veterinary Medicine

Professor, Department of Pathobiological Sciences

LETTER FROM OUR ASSOCIATE DEAN FOR RESEARCH AND ADVANCED STUDIES

The LSU School of Veterinary Medicine pursues advanced research to support equine health and welfare through its commitment to equine research and service and is recognized as one of the top equine programs in the United States. Our Equine Health Studies Program supports research efforts for discovery of novel therapies and investigates mechanisms of equine diseases such as laminitis, equine gastric disease, osteoarthritis, and equine viral arteritis, as well as technologies for improving reproductive health and stem cell therapies. These research efforts contribute to our mission of training the next generation of equine veterinarians and our service to the public.

Our faculty conduct research with funding from intramural EHSP and SVM support as well as from extramural grant agencies and industry. We are grateful for the support received from the National Institutes of Health, USDA, Equine Health Appropriations from the State of Louisiana, the Grayson Jockey Club Research Foundation, Elanco Animal Health, Boehringer Ingelheim Animal Health, Zinpro Corporation, Centaur Corporation, Seabuck Equine, LLC, SmartPill Corporation, Pall Corporation, Purina Animal Health, Darling Ingredients, Inc. (Sonac), Randlab, and Kindred Bioscience, Inc., just to name a few! We applaud the efforts of our faculty contributing to the EHSP to ensure that equine health remains one of the top priorities of the LSU SVM.

Sincerely,

Rhonda Cardin, A.B., Ph.D.

Associate Dean for Research and Advanced Studies

Professor, Department of Pathobiological Sciences



LETTER FROM OUR DIRECTOR

As Director of the Equine Health Studies Program (EHSP), it is my pleasure to present the visionary 2020 EHSP Research Report from the LSU School of Veterinary Medicine. Since the program's initial funding in 2005, the program remains strong and carries on the original mission of improving the health and well-being of horses. This research report documents contributions by numerous faculty and staff in the program.

The EHSP team remains committed to the health, well-being, and performance of horses through veterinary research, education, and clinical and public service, and I congratulate the contributors to the program. The EHSP team continues to produce high quality biomedical research, address horse health and welfare, and disseminate that information to the local, state, regional and worldwide stockholders.

The EHSP biomedical research team has diverse research interests with one major goal: to improve the health and welfare of the horse. Investigators represented in this report contributed information in the areas of equine surgery, gastrointestinal disease (colitis and gastric ulcer disease), laminitis, reproduction, respiratory disease, and lameness. Each study in this report benefits the horse and the equine industry by identifying essential mechanisms of disease, groundbreaking new treatments, essential techniques in reproduction, and essential information to prevent diseases.

Many of the studies found in this report were presented at local, regional, national and international meetings, including the American Association of Equine Practitioners (AAEP), American College of Veterinary Surgery (ACVS), American College of Veterinary Internal Medicine annual forum (ACVIM), Colic Research Symposium, Havemeyer Workshops, British Equine Veterinary Association Congress, Veterinary Orthopedic Society (VOS), EPM Society, Applied Equine Nutrition and Training Conference, International Equine Infectious Disease Conference, and American Society of Animal Science. EHSP researchers continue to be sought-after board members to review grants, present at state, regional, national, and international meetings and asked to present keynote speeches.

The biomedical research outlined in this report and state-of-the-art facilities on campus are the result of continued support from the Louisiana Governor's Biotechnology Initiative Grants Program, Louisiana Board of Regents Enhancement Grants Program, and a statutory dedication from the Louisiana racetrack slot machine tax revenues. This state funding provides program with technical support and intramural funds to generate pilot data that leads to extramural funding from outstanding granting institutions like the Grayson Jockey Club Research, Morris Animal Foundations, Pennington Biomedical Research Foundations, National Wetlands



Research Center, the Bureau of Land Management, United States Department of Agriculture, National Institutes of Health, and our industry partners, including Boehringer Ingelheim Animal Health, Elanco Animal Health, SmartPak® Equine, LLC, Zinpro Corporation, Darling Ingredients (Sonac), The High Bush Blueberry Council, W.F. Young, Inc., and Purina Animal Health, among others.

In addition, I want to take this opportunity to thank the many donors to the Equine Program at LSU. Our program is enriched with these generous contributions from horse owners and horse lovers. These funds provide value-added services to provide for the more than 80 rescued Thoroughbreds in our herd. I would like to thank the research associates, undergraduates, professional student workers, and many summer scholars, who helped to bring you this report.

That being said, we owe our deepest gratitude to the horses and ponies in the EHSP herd. The information presented in this report would not have been possible without the availability and use of these horses. All biomedical research on animals at LSU is conducted under Federal Guidelines for the Humane Care and Use of Animals and approved by the LSU Institutional Animal Care and Use Committee (IACUC). These horses are valued members of our program and treated with kindness and dignity.

Sincerely,

Frank M. Andrews, DVM, MS, DACVIM (LAIM)
LVMA Equine Committee Professor and Director
Equine Health Studies Program

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The *Equine Research Report* is published by the Louisiana State University, School of Veterinary Medicine, Baton Rouge, LA 70803. Please send comments to Ginger Guttner, MMC, APR, communications manager, at ginger@lsu.edu.

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Our Mission: The LSU Equine Health Studies Program will become a premier equine biomedical center in the 21st century through leading-edge research of equine diseases, contemporary instruction of professional veterinary students and veterinarians in advanced studies programs, and enhanced continuing education of the horse-owning public and private equine practitioners, with the ultimate goal of providing state-of-the-art diagnostic and therapeutic capabilities for critically ill and injured horses, and optimal clinical service to horsemen in Louisiana and the surrounding region.

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The EHSP is part of the LSU School of Veterinary Medicine, which is one of only 30 veterinary schools in the U.S. and the only one in Louisiana. The EHSP is supported with funds provided by the Louisiana State University School of Veterinary Medicine, the State of Louisiana and contributions from private donors.

The LSU School of Veterinary Medicine: We teach. We heal. We discover. We protect.

Frank M. Andrews, DVM, MS, DACVIM, LVMA Equine Committee Professor, Director of the Equine Health Studies Program, and Interim Head of the Department of Veterinary Clinical Sciences

Dr. Andrews received his DVM and MS from Washington State University in 1983. He completed one year in private practice at Associated Veterinary Clinics, Inc. in Walla Walla, Wash., and completed a large animal internal medicine residency in 1988 at The Ohio State University College of Veterinary Medicine. Dr. Andrews became a Diplomate of the American College of Veterinary Internal Medicine in 1989 and was on the faculty at the University of Tennessee College of Veterinary Medicine from 1988-2008. His research focuses on investigating treatment and prevention of gastric ulcer disease, gastric emptying and gastrointestinal motility, and diagnosis and treatment of pituitary par intermedia dysfunction (Equine Cushing's Disease).

Chance Armstrong, DVM, MS, DACT, Assistant Professor of Food Animal Health Management, Veterinary Clinical Sciences

Dr. Armstrong received his DVM in 2010 and his MS in 2016 from Auburn University. He also completed his theriogenology residency at Auburn in 2015. He is a Diplomate of the American College of Theriogenologists. His research focuses on infertility of cattle with a particular study of Trichomoniasis. Dr. Armstrong was also recognized as a 40 under 40 professional in 2014 by Vance Publishing, which is a list of the most influential people in agriculture. He joined the faculty in 2015.

Rose Baker, BVMS, MS, Assistant Professor of Equine Medicine, Veterinary Clinical Sciences

Dr. Baker is an assistant professor of equine medicine in the Department of Veterinary Clinical Sciences. She joined the faculty on September 21, 2017. She received her BA from Johns Hopkins University in 2005. She received her BVMS from the University of Glasgow in 2012 and her cVMA from the CuraCore Integrative Medicine & Education Center in 2014. Dr. Baker received her MS from Oregon State University in 2017. She completed an equine medicine and surgery internship at North Carolina State University in 2013 and then completed a large animal clinical fellowship in 2014 followed by a large animal medicine residency in 2017, both at Oregon State University. Dr. Baker's teaching interests are in emergency and critical care, equine neurological disorders, and helping students develop proficiency in clinical and communication skills. Her research interests are in equine critical care (specifically monitoring techniques to improve assessments of patient response to treatment) and equine gastroenteric diseases.

Udeni Balasuriya, BVSc, MS, Ph.D., FSLCVS, Director, Louisiana Animal Disease Diagnostic Laboratory, and Professor, Pathobiological Sciences

Dr. Balasuriya's graduated from Faculty of Veterinary Medicine and Animal Science, University of Peradeniya, in Sri Lanka. He then joined the Veterinary Research Institute as a Research Officer and became involved in disease diagnosis and surveillance. He came to the United States as a Fulbright Scholar and completed a Master's and Ph.D. degree in Comparative Pathology (diagnostic pathology and molecular virology) University of California, Davis. He joined the faculty at the Maxwell H. Gluck Equine Research Center (GERC), Department of Veterinary Science, at the University of Kentucky in August 2005. He was awarded the Jes & Clementine Schlaikjer Professorship in Equine Infectious Diseases in the Department of Veterinary Science. Dr. Balasuriya is currently Director of the Louisiana Animal Disease Laboratory, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA. His research focus includes characterizing the molecular epidemiology and pathogenesis of equine arteritis virus (EAV) and equine herpesvirus-1 (EHV-1) infections and development of improved vaccines to prevent infection.

Heidi Banse, DVM, Ph.D., DACVIM, Assistant Professor of Equine Medicine

Heidi E. Banse, DVM, Ph.D., DACVIM, is an assistant professor of equine medicine in the Department of Veterinary Clinical Sciences. She joined the faculty on August 17, 2017. Dr. Banse received her BS in 2004 and her DVM in 2007, both from Washington State University. She completed a large animal internship at the University of Georgia in 2008 and an equine medicine residency at

Oklahoma State University in 2011. She received her Ph.D. from Oklahoma State University in 2013. She then spent four years on faculty at the University of Calgary in Alberta, Canada. Dr. Banse is a Diplomate of the American College of Veterinary Internal Medicine (Large Animal). Her teaching interests are in equine endocrinology and pharmacology and her research focus is in equine gastric disease and equine endocrinology.

Renee T. Carter, DVM (LSU SVM 2000), DACVO, Associate Professor of Ophthalmology, Veterinary Clinical Sciences

Dr. Carter received her DVM from the LSU SVM in 2000 and completed a rotating internship in small animal medicine and surgery at the LSU SVM in 2001. She completed a four-year comparative ophthalmology residency and fellowship at the University of Madison-Wisconsin in 2006 and returned to LSU as an assistant professor. Dr. Carter became a Diplomate of the American College of Veterinary Ophthalmologists in 2007 and her research focuses on corneal wound healing disorders and the role of leptospirosis in the pathogenesis of equine recurrent uveitis.

Ann Chapman, DVM (LSU SVM 2001), MS, DACVIM, Associate Professor of Equine Medicine, Veterinary Clinical Sciences

Dr. Chapman was born and raised in Harrisburg, Penn. She received her BA in biology from Gettysburg College in 1990 and worked in laboratory research in both government and private sectors. She received her DVM from the LSU SVM in 2001. After working in private practice for one year, she began her combination equine internal medicine residency/graduate program at the LSU SVM in 2002. Dr. Chapman completed her residency in 2005 and became a Diplomate of the American College of Veterinary Internal Medicine. She received an MS in 2006 from the LSU SVM. She performs mobile equine medicine consultation throughout Louisiana and equine ambulatory medicine to the Baton Rouge community. Her research interests include endocrine diseases, pars intermedia pituitary dysfunction (PPID), equine cardiology, and infectious disease, especially Salmonella detection and prevention. Dr. Chapman is also section chief of the Equine Ambulatory Service, which provides general specialty services to Baton Rouge, the region and the State of Louisiana.

Shafiqul Chowdhury, DVM, MS, Ph.D., Professor, Pathobiological Sciences

Dr. Chowdhury received his DVM and MS degrees from Bangladesh Agricultural University (Bangladesh) and a Ph.D. from the Goethe Institute (Germany). He completed a post-doctoral fellowship in the Department of Microbiology at the University of Texas Health Sciences Center in Houston, Texas. Dr. Chowdhury was a research scientist at Bayer Animal Health and was on the faculty at Kansas State University College of Veterinary Medicine for 18 years before coming to LSU in 2008. His research interests include gene characterization and vaccine development for Equine Herpes Virus 1 and Bovine Herpes Virus 1. He has received and completed several USDA grants and works closely with industry.

Jeannette Cremer, DVM, Dr.med.vet., DACVAA, Assistant Professor of Anesthesiology, Veterinary Clinical Sciences

Dr. Cremer received her DVM in 2003 and her Dr.med.vet. in 2005, both from Ludwig Maximilians University (Germany). She is a Diplomate of the American College of Veterinary Anesthesia and Analgesia. Dr. Cremer completed her anesthesia residency at the University of Georgia in 2011. She joined the faculty of the LSU SVM in 2014. Dr. Cremer's research interests are in the evaluation of learning competencies, validation of teaching methods, influence of computer based learning, and analgesic techniques.

Levent Dirikolu, Ph.D., Professor, Comparative Biomedical Sciences

Dr. Dirikolu, professor in Comparative Biomedical Sciences (CBS) and director of the Equine Medication Surveillance Laboratory, joined the faculty in January 2016. He received his DVM from Ankara University (Turkey) in 1992, his MVSc and his Ph.D., both from the University of Kentucky in 2001. He completed a post-doctoral fellowship in veterinary pharmacology from the University of Kentucky in 2002.

Joseph Francis, BVSc, MVSc, Ph.D., Associate Dean of Faculty Affairs and Professor, Comparative Biomedical Sciences

Dr. Francis is associate dean of faculty affairs and a professor in the Department of Comparative Biomedical Sciences. He joined the faculty in 2003. Dr. Francis received his BVSc in 1990 and his MVSc in 1994, both from the Madras Veterinary College in India. He received his Ph.D. from Kansas State University in 1999. His research focuses on the brain mechanisms regulating cardiovascular function, specifically the understanding of the central nervous system interactions of cytokines renin-angiotensinaldosterone system in heart failure. He is also conducting research on the benefits of blueberries and the effects of exercise.

Lorrie Gaschen, DVM, Ph.D., DECVDI, Director of Diversity and Inclusion and Professor of Diagnostic Imaging, Veterinary Clinical Sciences

Dr. Gaschen received her BS and DVM degrees from the University of Florida in 1985 and 1990, respectively. She received her Ph.D. from the University of Utrecht (Netherlands) in 2001. She is a Diplomate of the European College of Veterinary Diagnostic Imaging. She joined the faculty at LSU in 2006. Dr. Gaschen's research interests are in vascular imaging and ultrasound of the gastrointestinal tract and pancreas, and MRI.

L. Abbigail Granger, DVM, MS, DACVR, Associate Professor of Diagnostic Imaging, Veterinary Clinical Sciences

Dr. Granger received her DVM from the University of Tennessee and completed a radiology residency. She is a Diplomate in the American College of Veterinary Radiology. Her teaching interests include radiographic interpretation, ultrasound performance and interpretation (basic, intermediate, and expert), and research methods. Her research interests include functional CT, thoracic CT with emphasis on airways and interstitial disease, ultrasound in endocrine diseases, and correlation of ultrasound with pathological findings. Dr. Granger is also the service chief for the LSU SVM Diagnostic Imaging Service.

Chiara De Caro Carella Hampton, DVM, MS, Assistant Professor of Anesthesiology, Veterinary Clinical Sciences

Dr. Hampton is an assistant professor of veterinary anesthesiology in the Department of Veterinary Clinical Sciences. She joined the faculty on July 26, 2016. She received her DVM from the Università degli Studi di Messina (Italy) in 2008 and her MS from Oregon State University in 2016; she completed her residency at Oregon State University in 2016, as well. Dr. De Caro Carella's teaching interests are in teaching acid-base physiology and diagnostic approaches, and her research focus is in hemodynamic monitoring under anesthesia and anesthetic techniques in swine to improve their overall welfare.

Samithamby Jeyaseelan, DVM, Ph.D., Professor, Pathobiological Sciences

Dr. Jeyaseelan received his DVM degree from the University of Peradeniya (Sri Lanka) in 1992. He received his Ph.D. in pulmonary immunology from the University of Minnesota College of Veterinary Medicine in 2001. He completed his first post-doctoral training at Yale University in pulmonary immunology in 2003 and his second post-doctoral training at National Jewish Health/Colorado Health Sciences Center in lung biology in 2004, where he was also on the faculty from 2004-07. In addition to being a professor in PBS, Dr. Jeyaseelan is also the director of the NIH-funded COBRE Center for Lung Biology and Disease. He also serves as the Dr.

William L. Jenkins Endowed Professor in veterinary Medicine. His research focuses on investigating the mechanisms underlying lung inflammation and host defense in response to bacterial pathogens. Dr. Jeyaseelan has published more than 50 original articles and more than 16 review articles. He has served as an associate editor of the Journal of Immunology, serves as an academic editor of PLoS One and serves on the editorial boards of American Journal of Respiratory Cell and Molecular Biology and Shock. Dr. Jeyaseelan's research is primarily funded by the National Institutes of Health.

Britta Leise, DVM (LSU SVM 2002), MS, Ph.D., DACVS, Associate Professor of Equine Surgery, Veterinary Clinical Sciences

Dr. Leise received her undergraduate degree from Virginia Tech in animal sciences and from there went to Louisiana State University where she received a Master's degree in equine reproductive endocrinology. In 2002, she graduated from Louisiana State University School of Veterinary Medicine. She then completed an internship at the University of Georgia in large animal surgery and medicine. Dr. Leise returned to Baton Rouge where she completed a residency in equine surgery and became a Diplomate of the American College of Veterinary Surgeons in 2008. She was a clinical instructor in equine emergency and critical care at The Ohio State University from 2007 until 2010, where she completed her Ph.D. in Comparative and Veterinary Medicine with a focus on the role of inflammation and the epithelial cell in equine laminitis. From there Dr. Leise became faculty at Colorado State University from 2011-2015 as an assistant professor of equine surgery and lameness. She returned to LSU in October 2015 as assistant professor of equine surgery. Her research interest includes equine laminitis, wound healing, and inflammatory conditions in the horse.

Andrew Lewin, BVM&S, DACVO, Assistant Professor of Ophthalmology

Dr. Lewin graduated from the University of Edinburgh in 2010 as a veterinarian and has since worked in the UK, New York, Wisconsin and Louisiana. He is certified by the American College of Veterinary Ophthalmologists. His research interests include ocular infectious disease, next-generation sequencing, and clinical veterinary ophthalmology.

Mandi J. Lopez, DVM, MS, Ph.D., DACVS, Professor, and Director of LECOR, Veterinary Clinical Sciences

Dr. Lopez received her BS from Humboldt State University in Arcata, Calif., and her DVM from the University of California-Davis. She completed a food animal internship at Kansas State University prior to going to the University of Wisconsin, where she completed a residency in large animal surgery and obtained MS and Ph.D. degrees. She then did a post-doctoral fellowship in applied biomechanics. Her areas of interest are tissue regeneration, orthopedic surgery, laminitis, and joint diseases. Dr. Lopez has expertise in both applied and basic research, holds several patents for biomedical devices, and she is a diplomate of the American College of Veterinary Surgeons. She came to LSU in 2004 and directs the Laboratory of Equine and Comparative Orthopedic Research (LECOR).

Aliya Magee, DVM (LSU SVM 2009), MS, DACVIM (Cardiology), Assistant Professor, Veterinary Clinical Sciences

Dr. Magee received her DVM from Louisiana State University School of Veterinary Medicine in 2009 and MS from Purdue University School of Veterinary Medicine in 2013. She completed a Cardiology residency at Purdue University and is board certified in the American College of Veterinary Internal Medicine, Cardiology. Her clinical and research interests include comparative cardiac disease.

Charles T. “Chuck” McCauley, DVM, MS, DABVP, DACVS, Assistant Professor of Equine Surgery, Veterinary Clinical Sciences

Dr. McCauley joined the equine faculty at the LSU SVM in 2006. Prior to that, Dr. McCauley was employed in a busy private referral practice in northeast Texas. He received his DVM from Texas A&M University and completed an internship and residency in food animal medicine and surgery at Oklahoma State University. In addition, Dr. McCauley completed a residency in large animal surgery (equine emphasis) at Purdue University. He is a Diplomate of both the American Board of Veterinary Practitioners (Food Animal Practice) and the American College of Veterinary Surgeons (Large Animal Surgery).

Mustajab Mirza, DVM, MS, DACVS, Associate Professor of Equine Surgery, Veterinary Clinical Sciences

Dr. Mirza received his DVM from the College of Veterinary Sciences Lahore affiliated with the University of Agriculture (Pakistan) in 1992. He completed his surgery residency and received his MS degree from the LSU SVM in 1998. Dr. Mirza is board certified in the American College of Veterinary Surgery. Dr. Mirza’s primary clinical interests include repair of long bone fractures and pathogenesis of colics in equids, laminitis, ophthalmology, and advanced wound healing. He primarily provides after-hours emergency equine services for the LSU Veterinary Teaching Hospital. Dr. Mirza’s research interests are in long bone fractures, performance limitations, advanced therapeutics for osteoarthritis, and gastrointestinal disease in horses.

Colin F. Mitchell, BVMS, MS, DACVS, Large Animal Hospital Director and Professor of Equine Surgery, Veterinary Clinical Sciences

Originally from Perth, Scotland, Dr. Mitchell received his veterinary medical degree from the University of Edinburgh and completed an internship at the University of Prince Edward Island prior to entering a combined three-year equine surgery residency and MS graduate program at the University of Minnesota, which he completed in 2004. He then remained on the hospital staff at the University of Minnesota, where he worked as the equine emergency clinician/surgeon until 2005, when he joined the faculty at the LSU SVM. He is a Diplomate of the American College of Veterinary Surgeons, and his clinical interests include orthopedic, laparoscopic and respiratory surgery. His research interests include orthopedic implants and laminitis and pharmaceutical treatment of navicular disease.

Dale L. Paccamonti, DVM, MS, DACT, Professor and Head, Veterinary Clinical Sciences

Dr. Paccamonti, originally from Kankakee, Ill., received his DVM from Michigan State University in 1981. After four years in a mixed practice in Chestertown, Md., he pursued advanced training at the University of Florida, where he completed a residency in theriogenology and received his MS degree in 1988. Dr. Paccamonti is a Diplomate in the American College of Theriogenologists. He joined the faculty at the LSU SVM in 1988. Dr. Paccamonti has served head of the Department of Veterinary Clinical Sciences and a professor of theriogenology. His primary research interests include the study of infertility in mares, assisted reproduction techniques in horses, factors affecting sperm motility in stallions, semen cryopreservation in stallions, and the process of fetal maturation and parturition in mares. He also collaborated in reproductive research in other domestic species. Dr. Paccamonti retired from the LSU School of Veterinary Medicine in August 2020.

Daniel B. Paulsen, DVM, MS, Ph.D., DACVP, Professor, Pathobiological Sciences

Dr. Paulsen received his DVM in 1977 and his MS in 1978, both from Kansas State University. In 1989, he received his Ph.D. from Oklahoma State University. Dr. Paulsen’s major research interests are in bovine respiratory disease with emphasis on *Mannheimia haemolytica*, *Pasteurella multocida*, infectious bovine rhinotracheitis and bovine respiratory coronavirus; pathogenesis, bacterial genetics, respiratory immunity and vaccinology; toxicologic pathology associated with inhaled toxins and effects of inhaled substances on the pathogenesis of asthma; and application of immunohistochemical techniques in equine respiratory disease and laminitis. In addition to being a professor in PBS, Dr. Paulsen is the director of the Louisiana Animal Disease Diagnostic Laboratory.

Carlos Pinto, DVM, Ph.D., DACT, Professor of Theriogenology, Veterinary Clinical Sciences

Dr. Pinto received his DVM from Sao Paulo State University (Brazil) in 1986 and his Ph.D. from the LSU School of Veterinary Medicine in 2001. He is a Diplomate of the American College of Theriogenologists. Dr. Pinto's clinical interests are in comparative theriogenology and assisted reproduction in equine, bovine, and canine species. He joined the faculty in 2013 and his primary research interests include mare reproductive endocrinology and assisted reproduction.

Cherie Pucheu-Haston, DVM (LSU SVM 1992), Ph.D., DACVD, Associate Professor of Dermatology, Veterinary Clinical Sciences

Dr. Pucheu-Haston received her DVM in 1992 from the LSU School of Veterinary Medicine and completed an internship in small animal medicine and surgery at LSU in 1993. She received her residency training in veterinary dermatology at North Carolina State University and is a Diplomate of the American College of Veterinary Dermatology. She worked as a specialist in private practice for seven years, then returned to NCSU in 2002 to pursue advanced graduate training. She received her Ph.D. in immunology (with a minor in biotechnology) from NCSU in 2006. She completed three years as a post-doctoral research associate in the Immunotoxicology Branch of the U.S. Environmental Protection Agency, as a grantee from the University of North Carolina-Chapel Hill. Dr. Pucheu-Haston returned to LSU as a faculty member in 2011. Her clinical and research interests are in cutaneous and respiratory allergic diseases in cats, dogs, and horses, and in the immunologic response to cutaneous fungal infections.

Patricia Queiroz-Williams, DVM, MS, Associate Professor of Veterinary Anesthesiology, Veterinary Clinical Sciences

Dr. Queiroz-Williams joined the faculty of the LSU SVM in 2007. She received her DVM from the Universidade Federal de Minas Gerais (Brazil) in 1996 and her MS from the Universidade Estadual Paulista School of Medicine (Brazil) in 2002. She also completed a residency and her MS in anesthesiology at the Universidade Estadual Paulista (Brazil). Her research interests include inhalational MAC studies; Pulse Pressure Variation and Stroke Volume Variation monitoring in colic horses; pain management and its assessment in different species; anesthetic drugs' pharmacodynamic/pharmacokinetic.

Nathalie Rademacher, Med.Vet., DACVR, DECVDI, Associate Professor of Diagnostic Imaging, Veterinary Clinical Sciences

Dr. Rademacher received her Med.Vet. from the Justus-Liebig-University (Germany) in 2000 and her Dr.med.vet. from the University of Berne (Switzerland) in 2003. After completion of a small animal internship in a private referral center in Switzerland, she completed a diagnostic imaging residency in 2006 at the Vetsuisse Faculty (Switzerland). Dr. Rademacher is a Diplomate of both the European College of Veterinary Diagnostic Imaging and the American College of Veterinary Radiology. She joined the faculty of the LSU SVM in 2007. Dr. Rademacher's research focus is ultrasound in small and large animals, contrast enhanced ultrasound of the pancreas in dogs and cats, elastographic ultrasound application and lung ultrasound in dogs.

Laura Riggs, DVM, Ph.D., DACVS, Associate Professor of Equine Surgery, Veterinary Clinical Sciences

Dr. Riggs is originally from Memphis, Tenn., and received her DVM from the University of Tennessee College of Veterinary Medicine in 2001. She completed a large animal internship followed by a large animal surgery residency at the University of Georgia. In 2007 she received her Ph.D. in veterinary physiology from the University of Georgia with research studying biomarkers in equine laminitis. Dr. Riggs is a Diplomate of the American College of Veterinary Surgeons. Her research focuses on lameness, laminitis, and fracture repair biomechanics.

Clare Scully, MA, DVM, MS, Assistant Professor of Food Animal Health Maintenance, Veterinary Clinical Sciences

Dr. Scully received her DVM from the University of Tennessee in 2011 and received her MS from Oregon State University in 2015. She is board certified in the American College of Theriogenology. Her clinical interests include advanced reproduction techniques in ruminants, pain management in food animals, as well as food animal surgery. In 2013 Dr. Scully won the Western Veterinary Conference Food Animal Incentive Award and was awarded the Society of Theriogenology Emerging Leader Scholarship in 2014. Dr. Scully joined the faculty in 2015.

Jennifer Sones, DVM (LSU SVM 2008), Ph.D., DACT, Assistant Professor of Theriogenology, Veterinary Clinical Sciences

Dr. Sones received her BS from LSU in 2004 and her DVM from the LSU School of Veterinary Medicine in 2008. She received her Ph.D. from Cornell University in 2014 in molecular and integrative physiology. She completed her theriogenology residency at Cornell and is board certified in the American College of Theriogenology. Dr. Sones joined the faculty in 2015. Her research interests include comparative pregnancy physiology, preeclampsia and fetal growth restriction, and equine placentitis.

Matt Welborn, DVM, MPH, ACVPM, Professor of Food Animal Health Management, Veterinary Clinical Sciences

Dr. Welborn received his DVM from the LSU School of Veterinary Medicine in 1987 and his MPH from the University of Tennessee in 2005. He is a Diplomate of the American College of Veterinary Preventive Medicine, and his specialty is in farm animal production medicine. His research and clinical interests are in veterinary public health, agroterrorism, emergency preparedness, and toxic plants. Dr. Welborn joined the faculty in 2012.

Research associate retires after more than 30 years with LSU SVM equine program

Catherine Koch retired on November 16, 2018, as a research associate after 32 years of dedicated service to the Equine Health Studies Program and the LSU SVM. She joined the LSU SVM staff as research associate in 1986. Catherine worked with Dr. Susan Eades and Dr. Rebecca McConnico and was instrumental in setting-up and running the Ussing's Chambers system, which measures electrolyte fluxes within the equine intestines. Everyone Catherine worked with highly regarded her work ethic and congeniality. According to one faculty member, "Catherine was well organized, paid attention to details, and was a dependable co-worker." Catherine was heavily involved with graduate and professional student laboratory training as part of the Summer Scholars Program. She studied at Morehead State University and LSU and lives in Baton Rouge, LA. Some of the EHSP research projects she was involved with included therapeutic agents in reducing inflammation in horses with laminitis, insulin resistance in equine digital vessels in laminitis, and effects of metronidazole and NSAIDs on right dorsal colon in horses.

TOP RIGHT: Catherine Koch (left) with Dr. Jill Johnson



BOTTOM RIGHT: Catherine Koch at her retirement party at the LSU SVM.



Former Graduate Students

Carlos Aguilar, DVM

Carlos Aguilar, DVM, from Obregon, Mexico, received his MS degree in May 2020 from the Veterinary Clinical Sciences. His thesis was entitled “In Vitro Analysis of Equine Platelet Rich Plasma and In Vivo Effect of Cytokines after Repeated Intra-Articular Injections in Osteoarthritic Joints,” and his major advisor was Associate Professor Laura Riggs, DVM, Ph.D., DACVS. In July, Dr. Aguilar is will begin a combined large animal surgery residency/Ph.D. program at the Atlantic Veterinary College at the University of Prince Edward Island in Canada.

Chelsey Leisinger, MS

Chelsey Leisinger, MS, from Cedar Falls, Iowa, received her Ph.D. in December 2018 in the Department of Veterinary Clinical Sciences. Her dissertation was entitled “An Examination of Preimplantation Embryos and Endometrium Developed During Induced Aluteal Cycles in the Mare,” and her major advisor was Dale Paccamonti, DVM, MS, DACT, professor and department head. Dr. Leisinger obtained her HCLD (High-complexity Clinical Laboratory Director) certification in the American Board of Bioanalysis and is the clinical laboratory director of Ovation Fertility in Baton Rouge and Lafayette, La.

Cole Sandow, DVM (LSU SVM 2013)

Cole Sandow, DVM (LSU 2013), from Baton Rouge, Louisiana, received his MS in May 2018 from the Department of Veterinary Clinical Sciences (VCS). His thesis was entitled, “An evaluation of pathophysiology and biomechanics of selected lamenesses in the horse,” and his major advisor was Laura Riggs, DVM, Ph.D., DACVS, associate professor of Equine Surgery in the VCS department. He received an Outstanding Surgical Resident award from the American College of Veterinary Surgeons and a resident research award from the Veterinary Orthopedic Society. Dr. Sandow is a surgeon at Haygard Equine Medical Center in Lexington, Kentucky, and is board certified in large animal surgery with the American College of Veterinary Surgeons.

Qingqiu Yang, BS

Qingqiu Yang, BS, from Chongqing, China, received his Ph.D. in December 2019 from the Veterinary Clinical Sciences department. His dissertation was entitled “Equine hoof stratum internum K14+CD105+progenitor cells: Culture, characterization, and model of epithelial to mesenchymal transition,” and his major advisor was Mandi Lopez, DVM, Ph.D., DACVS, professor. Dr. Yang has accepted a position as a post-doctoral researcher in City of Hope, California.



From left, Laura Riggs, DVM, Ph.D., DACVS, associate professor and Sandow’s advisor; Cole Sandow, DVM; and Joseph Francis, BVSc, MVSc, Ph.D., professor and LSU Graduate School representative.

Current Graduate Students

Luis Henrique de Aguiar, DVM, Ph.D., DACT

Dr. Aguiar received his DVM degree in 2011 and his Ph.D. in Biotechnology in 2017 from Santa Catarina State University (Brazil). He will be completing his residency in Theriogenology in the summer of 2021 and became a Diplomate of the American College of Theriogenologists in 2020. His clinical interests are in comparative Theriogenology and the use of assisted reproductive technologies in multiple species. He is currently pursuing a Masters degree in the Department of Veterinary Clinical Sciences, studying strategies to develop conventional equine in vitro fertilization. Dr. Aguiar major professor is Dr. Carlos Pinto.

Rita Aoun, MS

Rita Aoun received her BS degree in electrical engineering from Lebanese University in 2017 and her Master's degree in biomedical engineering from the University of Nevada in Reno. She developed her interest in the physics of the body through her research experience with pharmacologist, neurobiologist and biomedical engineers. She is currently a member of LECOR and is working towards her Ph.D. with Dr. Lopez as her major professor. Her area of study focuses on the biomechanical testing and 3D modeling of the equine foot in loading and unloading conditions.

Kalie Beckers, MS

Kalie Beckers is from Independence, Louisiana. She received her BS and MS degrees from Southeastern Louisiana University. Kalie is enrolled in the dual DVM/Ph.D. program and has completed the first 3 years of her veterinary curriculum and is currently working on her Ph.D. research. Her major professor is Dr. Jenny Sones and her thesis title is "The contribution of the maternal microbiome on reproductive function during pregnancy and disease. In addition to her research interest Kalie is an accomplished equestrian that competes nationally in 3-day eventing and has just completed veterinary acupuncture training from the Chi Institute in 2020.

Gabriel Castro, DVM

Dr. Castro-Cuellar is originally from Colombia. He received his DVM degree from La Salle University in Bogota, Colombia in April 2015. Currently he is a resident in Veterinary Anesthesia and Analgesia and a MS student in the department of Veterinary Clinical Sciences (VCS) at LSU. He is expected to complete his thesis in March 2022. Dr. Castro-Cuellar's thesis is entitled, "The chondrotoxicity, pharmacokinetics and pharmacodynamics of intra-articular buprenorphine in horses". His mentor is Dr. Jeannette Cremer, assistant professor in Veterinary Anesthesia and Analgesia in the VCS department at LSU.

Jonuel Cruz-Sanabria, DVM (LSU SVM 2015)

Dr. Cruz-Sanabria BS, DVM, received his Bachelor in Science from the University of Puerto Rico 2008. He graduated with a his Doctor of Veterinary Medicine degree from Louisiana State University in 2015. Following graduation, he completed an equine internship at Weatherford Equine Medical Center and a large animal surgery and medicine internship at the LSU School of Veterinary Medicine. From 2017-2018 he served as a research fellow in the Equine Health Studies Program. Dr. Cruz is currently is a third-year equine surgery resident and is working towards a Master's degree in Veterinary Clinical Sciences. His thesis is entitled "Development of an Ultrasound-Guided Perineural Injection Technique of the Caudal Cervical Spinal Nerve Roots in horses" and his major advisor is Dr. Britta Leise. Dr. Cruz is scheduled to complete his Master's degree in the summer of 2021.



GRADUATE PROGRAM

Viviane C. L. Gomes, DVM, DACT

Dr. Gomes, originally from Brazil, is a theriogenology resident and Ph.D. student at LSU SVM. She received her DVM from the Universidade Federal de Minas Gerais (Brazil) in 2014, after completing an exchange program at Kansas State University. Dr. Gomes worked as a veterinary technician and volunteer researcher at Rood and Riddle Equine Hospital (Kentucky) and completed an internship in Large Animal Field Services and Theriogenology at the University of Georgia. She worked as an equine practitioner and CEO of a veterinary clinical pathology laboratory in Brazil for two years before coming to LSU to pursue advanced training. Dr. Gomes is a Diplomate of the American College of Theriogenologists. Her clinical interests are comparative theriogenology and assisted reproduction in equine and canine species. Her research focuses on placentation and maternal-fetal interactions during pregnancy, using the horse and mouse as model species. Dr. Gomes's dissertation is entitled "The role of kisspeptins in Trophoblast Cell Dynamics", having Dr. Jenny Sones as her research mentor. Dr. Gomes expects to complete her doctoral studies in 2022.

Lawrence Kadic, MVetMed

Dr. Kadic graduated from the University of Ghent, Belgium in 2016. After graduation he went on and completed a one-year equine rotational internship at the Dubai Equine Hospital in the UAE. Having the goal of becoming an equine surgeon, he completed two more years as a surgery intern at Hagyard Equine Medical Institute in Kentucky and as a Large Animal Clinical Fellow at the Oregon State University in Corvallis. In 2019, Dr. Kadic started his 3-year Equine Surgery Residency at LSU. He is currently in his second year of his residency and is enrolled in a Master's program in Veterinary Clinical Sciences. His research is focused on the biomechanics of different type of constructs for metacarpo/metatarso-phalangeal arthrodesis in horses. His mentor and research advisor is Dr. Laura Riggs. He is due to complete this research in the spring of 2022.

Chun Kuen "Eric" Mak

Mak is a Ph.D. candidate and theriogenology resident at the LSU SVM. Mak's advisor is Dr. Carlos Pinto, professor of theriogenology. He received his DVM from National Taiwan University in 2017. His career goal is to become academic clinician-scientist specializing in comparative theriogenology.

Linda Paul, DVM

Dr. Paul is from Lake Jackson, TX and received her DVM degree from Cornell University in 2017. She completed a one-year, rotating equine internship at LSU and is currently the Equine Internal Medicine resident at the LSU Veterinary Teaching Hospital. Additionally, she is a Ph.D. student within the Veterinary Clinical Sciences Department under Dr. Heidi Banse. The focus of Dr. Paul's research is on equine glandular gastric disease (EGGD) to contribute to the understanding of this disease's pathophysiology. Current investigations are underway into the potential role of the gastric microbiome on the development and persistence of this disease.

Takashi Taguchi, DVM

Dr. Taguchi is from Sapporo Japan. He received his BS and DVM from Osaka Prefecture University in Osaka, Japan. He also has a Master's degree from Western University of Health Sciences. Dr. Taguchi is currently working on his Ph.D. under the guidance of Dr. Mandi Lopez. His thesis research involves novel, natural, and regenerative therapies for degenerative diseases in animals.



Phi Zeta Research Emphasis Day—a day established to promote research in schools of veterinary medicine, to recognize research conducted by veterinary students, House Officers (residents and interns), graduate students, post-doctoral fellows, and faculty, and to encourage veterinary students to pursue careers in research.

Phi Zeta is the national veterinary honor society, which recognizes and furthers scholarship and research in matters pertaining to the welfare and diseases of animals. The importance of this day to the LSU SVM is underlined by the fact that the Veterinary Teaching Hospital is closed except for emergencies to allow all students and House Officers to participate.

Phi Zeta Research Emphasis Day 2018

Ph.D. Students

Mak CK, Leisinger C, Coffman E, Medina V, Markle M, Paccamonti D, Pinto C.
Developmental Potentials of Equine Oocytes in the Breeding and Nonbreeding Seasons.

Yang Q, Lopez MJ.
Ultrastructure and Immunophenotype of Equine Hoof Stem Cells

Basic Research Student Competition for Master's Students, House Officers and Veterinary Students

Connard S, Oliveira A, Leise B.
Assessment of equine keratinocyte wound healing in vitro after exposure to bone marrow derived mesenchymal stem cells (BM-MSCs) or lipopolysaccharide (LPS).

Strother S, Stout RW, McCauley CT, Riggs LM, Mitchell CF, Al-Bagdadi FK.
Statistical analysis of the seminiferous tubule epithelium in experimental unilateral abdominal cryptorchid testes in 60-days-old rats.

Clinical Research Student competition for Master's Students, Interns and Residents

Aguilar C, Sandow C, Riggs L.
Evaluation of the Short-term Effects of Intra-Articular Administration of Platelet-rich Plasma in Horses with Experimentally Induced Synovitis.

Krueger CR, Nagle AM, Leise BS.
Clinical Features, Case Presentation and Prognostic Variables in Horses with Partial and Full Thickness Esophageal Perforation.

Negrão Watanabe TT, Andrews FM, Bauer R.
Malignant Gastrointestinal Stromal Tumor with Transplantation Metastasis in a Horse

Arana Valencia N, Andrews FM, Thibault M, Koch C, Perry R, Tischmacher A, Frank N.
The Effect of pH on Large Intestine Ion Transport and Transepithelial Resistance in Suspected Insulin Resistance Horses

Camacho-Luna P, Andrews F, Gaschen L, Markle M, Keowen M, Garza, Jr. F, Kearney M, Storey E.
Effects of 1% ophthalmic atropine sulfate solution on the GI motility and transit time in healthy horses

Garcia-Abarca N, Koch C, Riggs L, Chapman A, Leise B.
Effects of Altered Weight Bearing on Digital Perfusion in Horses

Cruz-Sanabria J, Gaschen L, Bragulla, Leise B.

Development of a Cervical Perineural Injection Technique in the Horse

Anderson A, Negrão Watanabe TT, Bauer R.

Systemic Aspergillosis Manifesting as Neurologic Disease in an Equine

Davolli G, Medina V, Pinto CRF.

Serial PGF2 α Injections Prevent Luteinization of Experimentally Induced Hemorrhagic Anovulatory Follicles in Mares

Kamper JA, Chapman AM, Keowen ML, Garza Jr. F, Cruz J, Francis J, Andrews FM.

The Effects of Blueberry Consumption on Exercise Training in Sedentary and Exercising Horses

Phi Zeta Research Emphasis Day 2019

Ph.D. Students

Mak CK, Medina V, Markle M, Pinto CRF

Characterization of Day 7 Equine Embryos in Aluteal and Aluteal- supplemented Cycles in Mares

Yang Q, Lopez MJ

Isolation and Characterization of Equine Hoof Transitional Progenitor Cells

Basic Research Student Competition for Master's Students, House Officers and Veterinary Students

Beckers KF, Heil BA, Thompson SK, Kearns TA, Murrell J, King G, Sones JL

Associations of the Microbiome in Equine Reproductive Tract Before and During the Breeding Season

Carossino M, Dini P, Kalbfleisch TS, Loynachan AT, Canisso IF, Cook RF, Timoney PJ, Balasuriya UBP

Equine arteritis virus long-term persistence is associated with upregulation of CD8 $^+$ T lymphocyte transcription factors, inhibitory receptors, and the CXCL16/CXCR6 axis

Carossino M, Barrandeguy ME, Li Y, Parreño V, Janes J, Loynachan AT, Erol E, Balasuriya UBR

Rapid detection, molecular characterization and phylogenetic analysis of G3P[12] and G14P[12] equine rotavirus strains co-circulating in central Kentucky

Third place went to Kalie Beckers, a member of the LSU SVM Class of 2022. Beckers is from Independence, La., and her project is entitled "Associations of the Microbiome in Equine Reproductive Tract Before and During the Breeding Season." Her faculty mentor is Jennifer Sones, DVM (LSU SVM 2008), Ph.D., DACT, assistant professor in VCS.

Third place went to Kelsey Olson, an undergraduate student at LSU pursuing a BS in Biological Sciences. Olson is from Baton Rouge, La., and her project is entitled "Reduction of Maternal Adiposity Attenuates Leptin Expression during Pregnancy in the Preeclamptic-like BPH/5 Mouse." Her faculty mentor is Jennifer Sones, DVM (LSU SVM 2008), Ph.D., DACT, assistant professor in VCS.

Clinical Research Student competition for Master's Students, House Officers and Veterinary Students

Bertrand A, Chapman A, Mirza M, Briscoe A, Windham J, Mauberret C, Andrews F.

Racehorse Safety in Louisiana

Krueger CR, Mitchell CF, Leise BS, Knych H.

Pharmacokinetics of Clodronate Disodium in Horses

Paul L, Banse H, Andrews F, Keowan M, Morales-Yñiguez FM, Garza F, and Ericsson A.

Comparison of the Gastric Microbiome in Horses with and without Equine Glandular Gastric Disease

Anderson A, Legendre K, Andrews F, Del Piero F.

Severe Idiopathic Liver Amyloidosis with Spontaneous Rupture in a Horse.

Garcia-Abarca N, Banse H, Terumi Negrao Watanabe T, Andrews F, Cruz-Sanabria J, Morales -Yñiguez FJ,Keowen M,Del Piero F.

Relationship of Endoscopic Appearance, Macroscopic, and Histopathologic Findings in Horses with and without Equine Glandular Gastric Disease

Morales-Yñiguez,Grimes JA, Hodgson M, Riggs LM

Comparison Between “Blind” and Ultrasound-guided Injection Techniques of the Navicular Bursa in Horses

Cruz-Sanabria J, Chapman AM, Kamper J, Keowen ML, Garza Jr.F, Liu, CC , Francis JJ, Andrews FM.

Blueberry feeding improves haematological parameters in exercising horses

Cruz-Sanabria J ,Chapman AM, Keowen ML, Kamper J, Garza Jr. F, Liu CC, Francis J, Andrews FM.

Blueberry feeding improves volume of work in exercising horses by lowering heart rate and lactate

Aguilar C,Sandow C, Rademacher N, Riggs L

Effects of Screw Size and Approach in Simulated Medial Condylar Fractures

Cruz-Sanabria J, Gaschen L, Bragulla H, Mitchell M, Leise B.

Development of a Cervical Perineural Injection Technique in the Horse

Morales Yñiguez FJ, Grimes JA, Hodgson M,Riggs LM.

Effect of Multiple Sterilizations on Biomechanical Properties of Surgical Screws

First place went to Clarisa Krueger, DVM, MS, an equine surgery resident at the LSU SVM. Dr. Krueger is from Mission, Texas, and her project is entitled “Pharmacokinetics of Clodronate Disodium in Horses.” Her faculty mentor is Britta Leise, MS, DVM (LSU SVM 2002), Ph.D., DACVS, assistant professor in VCS. Her research mentor is Colin Mitchell, DVM, DACVS, professor in VCS.

Post-doctoral Fellows

Mekuria Z, Nam B,Carossino M,Li G,Zheng Y, Zhang J, Cook F, Shuck K, Campos J, Squires E,Troedsson M, Timoney P, Balasuriya U.

Intra-host Selection Pressure Drives Equine Arteritis Virus Evolution during Persistent Infection in the Stallion Reproductive Tract

Faculty (Non-competing)

Chapman, A.M., Andrews, F.M., Ebenezer, P.J., Kemper, J. Garza, F., Keowen, M.L., Cruz-Sanabria, J., Liu, C.C., Francis, J.
The effects of blueberry consumption on reactive oxygen species in sedentary and exercising horses

Phi Zeta Day 2020

Ph.D. Students

Wang P, Takawira C, Niu X, Taguchi T, Yang Q, Nazzal M, Lopez M.
Kinetic Gait Evaluation of Equine Gait Alterations from Distinct Shoe Calks

Basic Research Student Competition for Master's Students, House Officers and Veterinary Students

Aguilar C, Leise B, Riggs L, McCauley C, Guerreo-Plata A.
Development of a Flow Cytometry Protocol for Evaluation and Analysis of Platelet Activation of Equine Platelet Rich Plasma with Different Calcium Chloride Concentrations

Arana Valencia N, Andrews FM, Chapman AM, Oberhaus EL, Koewen ML, Garza, Jr. F.
Comparative evaluation of three methods of insulin resistance testing in horses

Beckers K, Gomes V, Robillard K, Liu C, Johnston A, Sones J.
Phenotypic Differences Exist between BPH/5 Offspring in a Sex-Dependent Manner

Clinical Research Student Competition for Master's Students, House Officers and Veterinary Students

Schildroth N, Pinto C.
Using Serial PGF2a Administration to Prevent the Formation of Hemorrhagic Anovulatory Follicles in Mares

Ricord M, Andrews A., Yñiguez F, Keowen M., Garza F., Paul L., Chapman A., Banse H.
Impact of Concurrent Treatment with Omeprazole on Phenylbutazone-Induced Gastric Ulceration in Horses

Steiner M, Leise B, Bell H, Patton M, da Cunha A, Mitchell C, Fugler L.
The Use of Liposomal Bupivacaine as an Incisional Analgesic and its Effects on Wound Healing in Horses

Retif M, Andrews F, Banse H, St. Blanc M, Keowen M, Garza Jr. F, Arana-Valencia N, Liu C.
The Effects of Turmeric and Devils Claw on Equine Gastric Ulcer Scores

Miley KM, Kearns T, Thompson S, Murrell J, King G, Sones JL.
A Metagenetic Comparison of the Uterine Microbiome in the Estrual Mare: A Clinical Study

St. Blanc M, Andrews F
Clinical Efficacy of Fourteen Day Omeprazole Treatment for Equine Gastric Ulcer Syndrome: A Controlled Retrospective Study

Andrews F, Riggs L, Lopez M, Keowen M, Garza, Jr. F, Lui C, St. Blanc M, Miller T, Koenig K, Takawira C.
Effect of an Oral Supplement Containing Curcumin Extract (Longvida™) on Lameness Due to Osteoarthritis or Degenerative Disease and Gastric Ulcer Scores

Vincent L, McCauley C.

Measuring the Effect of Neurectomy of the Deep Branch of the Lateral Plantar Nerve on the Biomechanical Properties of the Equine Hind Suspensory Ligament

Paul L, Ericsson A, Andrews F, Keowan M, Morales-Yniguez F, Garza F, Banse H

Comparison of the Gastric Fluid and Glandular Mucosal Microbiome in Horses with and without Equine Glandular Gastric Disease (EGGD)

First place went to Lawrence Kadic, MVetMed, equine surgery resident at the LSU SVM. Dr. Kadic is from Diest, Belgium, and his project is entitled "Description of Atypical Osteochondritis Dissecans Lesions of the Distal Intermediate Ridge of the Tibia Diagnosed Radiographically in Seven Thoroughbred Horses (2008-2018)." This study was conducted at Hagyard Equine Medical Institute in Kentucky.

Second place went to Morgan Steiner, a member of the LSU SVM Class of 2021. Steiner is from Rogers, Ark., and her project is entitled "The Use of Liposomal Bupivacaine as an Incisional Analgesic and its Effects on Wound Healing in Horses." Her faculty mentor is Britta Leise, DVM, Ph.D., DACVS, associate professor of equine surgery in Veterinary Clinical Sciences (VCS).

Second place went to Michael St. Blanc, DVM (LSU SVM 2017), equine research intern the LSU SVM. Dr. St. Blanc is from Baton Rouge, La., and his project is entitled "Effect of an Oral Supplement Containing Curcumin Extract (Longvida™) on Lameness Due to Osteoarthritis or Degenerative Disease and Gastric Ulcer Scores." His faculty mentor is Frank Andrews, DVM, DACVIM, director of the Equine Health Studies Program at the LSU SVM.



PUBLICATIONS, ABSTRACTS AND PROCEEDINGS

PUBLICATIONS

- Baker, R., Schlipf, Jr., J. W., Jacqueline, B. V., Gorman, G. E. (2018). *Klossiella equi* infection in a Cheval Canadien Mare. *Veterinary Clinical Pathology*, 6. onlinelibrary.wiley.com/doi/pdf/10.1111/vcp.12660
- Baker, R., Schlipf, J. W., Scollan, K. F., LeBlanc, N., Russell, D. (2019). In-Hospital Development of an Aorto-cardiac Fistula in a Warmblood Gelding with Chronic Renal Disease. *Equine Veterinary Education*, 6.
- Banse, H., MacLeod, H., Crosby, C., Windeyer, M. C. (2018). Prevalence of and risk factors for equine glandular and squamous gastric disease in polo horses. *Canadian Veterinary Journal*, 59(8), 880-884.
- Banse HE, Schultz N, McCue ME, Geor R, McFarlane D. Comparison of two methods for measurement of equine adrenocorticotropin. *J Vet Diagn Invest*, 2018, 30: 233-237.
- Banse, H., Getachew, F., Levy, M., Smits, J. (2019). Influence of season and pituitary pars intermedia dysfunction on hair cortisol concentration in horses. *Domestic Animal Endocrinology*. (epub ahead of print). [Doi.org/10.1016/j.domaniend.2019.07.003](https://doi.org/10.1016/j.domaniend.2019.07.003)
- Banse HE and Andrews FM. Equine glandular gastric disease: prevalence, impact and management strategies. *Vet Med (Auckl)*, 2019, 10: 69-76.
- Beavers, K., Mitchell, C. F. (2017). Uncommon Castration Complication: Penile amputation and sheath ablation following an iatrogenic phallectomy. *Equine Veterinary Education*.
- Compton, N., Cary, J., Wenz, J., Lutter, D., Mitchell, C. F., Godfrey, J. (2019). Evaluation of peer teaching and deliberate practice to teach veterinary surgery. *Veterinary Surgery*, 48, 199-208.
- Daniel AJ, Leise BL, Selberg K, and Barrett M (2019) Enhanced ultrasonographic imaging of the equine distal limb using saline injection of the digital flexor tendon sheath: a cadaver study. *The Veterinary Journal*. 247:26-31.
- Davolli GM, Beavers KN, Medina V, Sones JL, Pinto CRF, Paccamonti DL. Concentrations of Sulfadiazine and Trimethoprim in Blood and Endometrium of Mares After Administration of an Oral Suspension. *Journal of Equine Veterinary Science*, 2018, Volume 67,27–30.
- Davolli, G. M., Medina, V., Pinto, C. R. (2018). Serial PGF2 α Injections Prevent Luteinization of Experimentally Induced Hemorrhagic Anovulatory Follicles (vol. 66, pp. 94). *Journal of Equine Veterinary Science*.
- Davolli, G., Sones, J., Paccamonti, D. L. (2018). Maintenance of pregnancy in mares without a source of endogenous progesterone using Altren (2nd ed., vol. 1, pp. 16). Northfield, MN: DVM Business Essentials.
- Devick, IF, Leise, BS, Rao S, and Hendrickson DA (2018) Evaluation of post-operative pain and complications after active carbon dioxide desufflation at completion of laparoscopy in mares. *Can Vet J*. 59(3):261-266.
- Hackett, ES, Leise, BS. (2019). Exercising upper respiratory videoendoscopic findings of 50 competition draught horses with abnormal respiratory noise and/or poor performance. *Equine Veterinary Journal*, 51(3), 370-374.

PUBLICATIONS, ABSTRACTS AND PROCEEDINGS



Heil, BA, Paccamonti, DL, Sones, JL (2019). Role for the mammalian female reproductive tract microbiome in pregnancy outcomes. *Physiological genomics*, 51(8), 390-399. PMID: 31251700

Heil, BA, Thompson, SK, Kearns, TA, Davolli, GM, King, G, Sones, JL. (2019) Metagenomic characterization of the equine uterine microbiome using multiple techniques. (vol. 66, pg. 111). *Journal of Equine Veterinary Science*.

Kramer, J., Rucker, A., Leise, B. (2018). Venographic evaluation of the circumflex vessels and lamellar circumflex junction in laminitis horses. *Equine Vet Educ*.

Leise, B. (2018). The role of neutrophils in equine laminitis. *Cell Tissue Res*, 371(3), 541-550.

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Mitchell, CF., Richbourg, HA, Goupil, BA, Gillett, A, McNulty, MA. (2017). Assessment of Tuber Coxae Bone Biopsy in the Standing Horse. *Veterinary Surgery*, 46, 396-402.

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Pedersen SK, Cribb AE, Windeyer MC, Read EK, French D, Banse HE. Risk factors for equine glandular and squamous gastric disease in showjumping Warmbloods. *Equine Vet J*, 2018, 50: 747-751.

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Trolinger-Meadows KD, Gaschen L, Riggs LM. What Is Your Diagnosis?. 2017; *Journal of the American Veterinary Medical Association*, 250(3), 275-277.

PRESENTATIONS AND PROCEEDINGS

Aguilar, C., Riggs, L. M., Leise, B., McCauley, C. T., Guerrero-Plata, M. A. "Platelet Activation Analysis in Equine PRP". ACVS Surgery Summit. Las Vegas, NV (October 2019).

Aguilar, C., Leise, B., McCauley, C. T., Riggs, L. M. "Development of a Flow Cytometry Protocol for Evaluation and Analysis of Platelet Activation of Equine Platelet Rich Plasma." NAVRMA, Ontario, Canada. (September 2019).

Andrews, F. M. . The effect of pH on large intestinal ion transport and transepithelial resistance in suspected insulin resistance horses (pp. 41). Coral Gables, FL: Proceeding Dorothy Havemeyer Foundation International Equine Endocrine Summit. [http:// sites.tufts.edu/ equineendogroup/](http://sites.tufts.edu/equineendogroup/) (2017)

Andrews, F. M., , "Case presentation in neurologic disease in horses," 22nd Annual American Board of Veterinary Practitioners Symposium Atlanta, GA. (October 6, 2017).

Andrews, F. M., "Common Neurologic Diseases, What's Old and What's New!," 22nd Annual American Board of Veterinary Practitioners Symposium, Atlanta, GA. (October 6, 2017).

Andrews, F. M., "Defining and localizing lesions of the nervous system," 22nd Annual American Board of Veterinary Practitioners Symposium Atlanta, GA. (October 6, 2017).

Andrews, F. M., "Performing the neurologic examination," 22nd Annual American Board of Veterinary Practitioners Symposium, Atlanta, GA. (October 6, 2017).

Andrews, F. M., "Treatment of neurologic diseases in horses," 22nd Annual American Board of Veterinary Practitioners Symposium , Atlanta, GA. (October 6, 2017).

Andrews, F. M., "Update on diagnosis and treatment of equine neurologic disease," 22nd Annual American Board of Veterinary Practitioners Symposium, Atlanta, GA. (October 6, 2017).

PUBLICATIONS, ABSTRACTS AND PROCEEDINGS



Andrews, F. M., "Gastroscopy Wetlab," North Eastern Association of Equine Practitioners Symposium, Norfolk, VA. (September 23, 2017).

Andrews, F. M., "Equine Gastric Ulcer Syndrome (EGUS): The Nitty Gritty!," North Eastern Association of Equine Practitioners Symposium, Norfolk, VA. (September 21, 2017).

Andrews, F. M., "Equine Gastric Ulcer Syndrome (EGUS): What about supplements!," North Eastern Association of Equine Practitioners Symposium, Norfolk, VA. (September 21, 2017).

Andrews, F. M., "Viral Respiratory Disease in Horses," North Eastern Association of Equine Practitioners Symposium, Norfolk, VA. (September 21, 2017).

Andrews, F. M. "Equine Gastric Ulcer Syndrome (EGUS): Update on Diagnosis and Treatment," Louisiana Veterinary Medical Association Winter Conference, Baton Rouge, LA. (January 20, 2017).

Andrews, F. M., "Equine Gastric Ulcer Syndrome (EGUS): What about supplements?," Louisiana Veterinary Medical Association Winter Conference, Baton Rouge, LA. (January 20, 2017).

Andrews, F. M., "Update on viral respiratory disease in horses," Louisiana Veterinary Medical Association Winter Conference, Baton Rouge, LA. (January 20, 2017).

Baker, R. E. , Schlipf, Jr., J. W. , Cebra, C. , Hikada, H., "Comparison of Cephalic to Jugular Venous Lactate in Horses with Colitis," International Veterinary Emergency & Critical Symposium, New Orleans, LA. (September 15, 2018).

Baker, R. E., "Equine Salmonella," Louisiana State University RVT Continuing Education Seminar. (April 28, 2018).

Baker, R. , "Neurologic Evaluation of the Performance Horse: Making a Diagnosis," Veterinary Meeting & Expo, Orlando, Florida. (January 23, 2019).

Baker, R., Yorke, E., "Performance Horse Emergencies: Case Based Discussions," Veterinary Meeting & Expo, , Orlando, Florida. (January 23, 2019).

Baker, R., "Poor Performance in the Horse: It's Not Always Due to Lameness," Veterinary Meeting & Expo, Orlando, Florida. (January 23, 2019).

Baker, R., "Trans-tracheal Wash: How to Perform in the Field," Veterinary Meeting & Expo, Orlando, Florida. (January 23, 2019).

Banse, "How to Manage Colic in the Field; How to Manage Laminitis in the Field," CanWest Veterinary Conference, Banff. (October 2017).

Banse, H., "When and which NSAID to use.," Alberta Horse Conference, Edmonton, AB. (February 2017).



PUBLICATIONS, ABSTRACTS AND PROCEEDINGS

Banse, H., "Approach to colic management in the field," Iowa Veterinary Medicine Association Conference, Des Moines, IA. (February 2017).

Banse, H. "NSAIDs: A review". Iowa Veterinary Medicine Association Conference, Des Moines, IA. (February 2017).

Banse, H "NSAIDs: A case-based approach to selection". Iowa Veterinary Medicine Association Conference, Des Moines, IA. (February 2017).

Banse, H. "Antimicrobials: a review". Iowa Veterinary Medicine Association Conference, Des Moines, IA. (February 2017).

Banse, H. "Antimicrobials: A case-based approach to selection". Iowa Veterinary Medicine Association Conference, Des Moines, IA. (February 2017).

Banse, H., Whitehead, A., "How to Diagnose and Treat Equine Glandular Gastric Disease." American Association of Equine Practitioners Convention (November 2017).

Banse, H., "Applying antimicrobial susceptibility testing," Equine Health Studies Program Rounds Baton Rouge, LA. (November 7, 2018).

Banse, H., McMillan, C., Anderson, S., Hecker, K., Skorobohach, B., Carter, R. T., Lewin, A., Baker, R., Dehghanpir, S., Hale, L., Grandt, B., Kondro, D., Dorosz, S., Ungrin, M., Warren, A. Validation of a canine ocular simulator for use in fundic examination Rothamsted, Harpenden, UK.: VetEd (2019)

Chapman, A. M. "Equine Asthma," Southwest Veterinary Symposium, San Antonio, TX. (September 23, 2017).

Chapman, A. M. "Update on Pituitary Pars Intermedia Dysfunction in Horses," Southwest Veterinary Symposium, San Antonio, TX. (September 23, 2017).

Chapman, A. M., "Equine Cushing's - PPID: What's New?," Louisiana Veterinary Medicine Association Winter Meeting, Baton Rouge, LA. (January 20, 2017).

Chapman, A. M., "Inflammatory Bowel Disease," Louisiana Veterinary Medicine Association Winter Meeting, Lafayette, LA. (February 8, 2019).

Cruz-Sanbria J, Gaschen L, Bragulla H, Mitchell M, Leise BS. "Development of an ultrasound-guided injection technique of the cervical nerve root for the treatment of neck pain in horses: A cadaveric study." American College of Veterinary Surgeons Surgery Summit, Las Vegas, NV (October 2019).

Gordon, M. B., Vineyard, K., Andrews, F. M. The effect of a natural-source mineral supplement on gastric juice pH in horses. Equine Science Society Proceedings (2017).

Gordon, M. B., Young, K., Jerina, M., Andrews, F. M. "The effect of a natural-source mineral supplement on gastric ulceration in horses". Equine Science Society Proceedings (2017)

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Francis A, Stephenson Z, Heil BA, Mitchell CF, Andrews FM, Sones J, Krueger C, Aguilar C. Successful management of urine pooling using phenylpropanolamine hydrochloride in an embryo transfer mare, 2018 Society for Theriogenology, Milwaukee, WI, August 2018.

Leise, B., "Equine head wounds: Assessment and treatment," North American Veterinary Conference Orlando, FL. (February 2017).

Leise, B., "Treating equine wounds: Case discussions," North American Veterinary Conference Orlando, FL. (February 2017).

Leise, B., "Dressing Selections for Equine Wounds," North American Veterinary Conference Orlando, FL. (February 2017).

Leise, B., "Management of Equine Wounds," LVMA Annual Equine Meeting, , Shreveport, LA. (September 25, 2017).

Leise, B., "Updates on the treatment of skin tumors in the horse," LVMA Annual Equine Meeting, Shreveport , LA. (September 24, 2017).

Leise, B., "Tips for equine laminitis management," LVMA Winter Meeting, Baton Rouge, Louisiana. (January 2017).

Leise, B., "Complications of urogenital surgery in the foal," American College of Veterinary Surgeons, Phoenix, AZ. American College of Veterinary Surgeons Surgical Summit (October 2018).

Leise, B., "Complications of urogenital surgery in the mare," American College of Veterinary Surgeons Surgical Sumitt, Phoenix, AZ. (October 2018).

Leise, B., "Management of complicated wound in the horse," International Veterinary Emergency and Critical Care Symposium, New Orleans, LA. (September 2018).

Leise, B., "Pain management in the critical orthopedic patient," International Veterinary Emergency and Critical Care Symposium, New Orleans, LA. (September 2018).

Leise, B., "Diagnostic imaging of the equine axial skeleton," Mississippi Veterinary Medical Association Annual Meeting, Orange Beach, AL. (July 2018).

Leise, B., "Diagnostic imaging of the equine forelimb," Mississippi Veterinary Medical Association Annual Meeting, Orange Beach, AL. (July 2018).

Leise, B., "Pathophysiology of equine laminitis," IX Ciclo Internacional Sobre Colica Equina Jaboticabal, Sao Paulo Brazil. (March 2018).

Leise, B., "Small intestinal surgery and post-operative ileus," IX Ciclo Internacional Sobre Colica Equina Jaboticabal, Sao Paulo Brazil. (March 2018).

Leise, B., Whitfield, C., "Equine Wounds: Case Discussions," VMX: Veterinary Meeting and Expo. Orlando, FL. (February 2018).



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Leise, B., "Topical therapies in equine wounds," VMX: Veterinary Meeting and Expo Orlando, FL. (February 2018).

Leise, B., "Wounds of the equine foot: Assessment and treatment," VMX: Veterinary Meeting and Expo Orlando, Orlando, FL. (February 2018).

Leise, B., "Treating equine distal limb wounds". VMX Veterinary Meeting and Expo; Orlando, FL, (January 2019).

Leise, B. and Riggs, L. "Equine wounds: Case discussions". VMX Veterinary Meeting and Expo; Orlando, FL, (January 2019).

Leise, B. "Equine wounds: Use of regenerative and complementary therapies". VMX Veterinary Meeting and Expo; Orlando, FL, (January 2019).

Leise, B. "Diagnosing and treating forelimb lameness in the horse". Mississippi State Veterinary Medical Association. Starkville, MS (February 2019).

Leise, B. "Diagnosing and treating hindlimb lameness in the horse". Mississippi State Veterinary Medical Association. Starkville, MS (February 2019).

Leise, B. Leukocytes and inflammatory signaling in laminitis. University of Pennsylvania Laminitis Research Symposium, Kennett Square, PA, (October 2019)

Leisinger, C.L. , Klein, C., Markle, M.L. , Premanandan, C., Sones, J., Pinto, C.R. , Paccamonti, D.L., XII, "Day 8 Embryos and Endometrium From Aluteal cycles in Mares Exhibit Differential Gene Expression," International Symposium for Equine Reproduction XII Cambridge, UK. (July 24, 2018).

McCauley, C.T., "Diagnostic Imaging of the Equine Skull," Mississippi Veterinary Medical Association Summer Conference, Orange Beach, AL. (July 14, 2018).

McCauley, C.T. , "Interpretation of Radiographs of the Hind Limbs," Mississippi Veterinary Medical Association Summer Conference, Orange Beach, AL. (July 14, 2018).

McCauley, C.T., "Radiographic Guidance for Foot Trimming," American Farriers Association, Dick Fungay Benefit and Appreciation Clinic, Baton Rouge, LA. (March 12, 2018).

Mirza, M.H., , "Education in disaster response, bootcamp 2018," AVMA Annual Conference, Denver, CO (July 17, 2018).

Mirza, M.H., "Fluid Management of the colic in the field," LVMA Winter Meeting, New Orleans, LA (January 27, 2018).

Mirza, M.H., "Fluid Therapy in horses," LVMA Winter Meeting, New Orleans, LA (January 27, 2018).

Mirza, M.H., "Managing colic in the Field," LVMA Winter Meeting, New Orleans, LA (January 27, 2018).

Mirza, M.H. , "Common colics and their treatment," LVMA Winter Meeting, New Orleans, LA. (January 27, 2018).

PUBLICATIONS, ABSTRACTS AND PROCEEDINGS



Mitchell, C. F. "Bisphosphonates and lame horses". Southwest Veterinary Symposium, San Antonio, TX (September 2017).

Mitchell, C. F. "The effects of bisphosphonates on bone in young horses". Southwest Veterinary Symposium, San Antonio, TX (September 2017).

Mitchell, C. F. "Procedures to help improve brood mare fertility and maintenance of pregnancy". Louisiana Veterinary Medical Association Shreveport, LA (2017).

Mitchell, C. F., "The use of bisphosphonates to treat lameness in performance horses," XIII Brazilian Congress and III International Congress of Surgery of the Brazilian College of Veterinary Surgery and Anesthesia, Belem, PA, Brazil. (September 2018).

Mitchell, C. F., "Serum testosterone concentrations following hCG stimulation in cryptorchid horses before and after castration," LSU SVM Lunch and Science Talk. (April 2018).

Mitchell, C. F., McNulty, M., "What we know regarding the use of bisphosphonates in horses" Experimental Biology, Orlando, FL (April 2019).

Mitchell, C. F., "Bisphosphonates in athletic horses". LVMA Equine Meeting (September 2019) .

Oliveria, A, Leise, B, Faleiros, R., "Mesenchymal stem cells marked by quantum dots adhesion in lamellar tissue from horses with chronic laminitis: A preliminary study". IX Ciclo Internacional Sobre Colica Equina, Jaboaticabal, Sao Paulo Brazil (March 2018).

Paccamonti, D. L., "Cryopreservation of Equine Embryos," 9th Leipzig Expert workshop on Equine Reproductive Medicine, Leipzig, Germany. (January 19, 2018).

Pinto, C. R., "Developmental Potential of Equine Oocytes in the Breeding and Nonbreeding Season," LSU-ACRES Symposium on Research for the Preservation of Endangered Species, Baton Rouge, LA. (August 7, 2018).

Pinto, C. R., "Developmental potential of equine oocytes collected during the breeding season, anestrus and vernal transition," 10th International Conference on Equine Reproductive Medicine, Leipzig, Germany. (January 19, 2018).

Richbourg H, Mitchell CF, McNulty MA. "Clodronate does not alter bone remodeling in young horses", Experimental Biology, Chicago, IL. (April 2017).

Riggs, L. M., "Clinical Applications of Laminitis Research," 14th Annual Promoting Excellence Symposium Florida Association of Equine Practitioners, Naples, FL. (October 20, 2018).

Riggs, L. M., "Electrophysical Rehabilitation Modalities: evidence-based medicine," 14th Annual Promoting Excellence Symposium Florida Association of Equine Practitioners, Naples, FL. (October 20, 2018).

Riggs, L. M., "Navicular Bursa," 14th Annual Promoting Excellence Symposium Florida Association of Equine Practitioners, Naples, FL. (October 19, 2018).



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Riggs, L.M., "PRP in Acute Injury," 14th Annual Promoting Excellence Symposium Florida Association of Equine Practitioners, Naples, FL. (October 19, 2018).

Riggs, L.M., "Acute Wounds: When to Worry," Louisiana Veterinary Medical Association Winter Meeting, New Orleans, LA. (January 28, 2018).

Riggs, L.M., "Assessment and Treatment of Equine Wounds," VMX: Veterinary Meeting and Expo, Orlando, FL. (January 21, 2019).

Riggs, L.M., "Local Blocks Used in the Management of Equine Wounds," VMX: Veterinary Meeting and Expo Orlando, FL. (January 21, 2019).

Riggs, L.M., "Managing Chronic Equine Wounds," VMX: Veterinary Meeting and Expo, Orlando, FL. (January 21, 2019).

Riggs, L.M., "Penetrating Equine Wounds: Assessment and Treatment," VMX: Veterinary Meeting and Expo, Orlando, FL. (January 21, 2019).

Sandow, C.B., Aguilar, C., Rademacher, N., Riggs, L.M. "Effects of Screw Size and Approach in Simulated Medial Condylar Fractures". ACVS Surgical Summit , Phoenix, AZ (October 2018).

Sandow CB, Rademacher N, Gaschen L, Riggs LM. "Spontaneous Osteonecrosis in a Thoroughbred Racehorse". Veterinary Orthopedic Society Conference. Snowmass, Colorado. (March 2018).

Sandow CB, Riggs LM. "Short-Term Effects of Intra-Articular Administration of Platelet-Rich Plasma in Horses." Veterinary Orthopedic Society Conference. Snowmass, Colorado. (March 2018).

Sandow, C.B., Riggs, L. M. (2018). "Evaluation of the Short-term Effects of Intra-articular Administration of Platelet-rich Plasma in Horses with Experimentally Induced Synovitis". American Association of Equine Practitioners, San Francisco, CA (December 2018).

Sones, J., 2018 Society For Theriogenology Meeting, "The equine placental microbiome," American College of Theriogenologists, Milwaukee, WI. (August 4, 2018).

Sones, J.L., "Equine Pregnancy: Physiology and Endocrinology," Louisiana Veterinary Medical Association Annual Meeting, New Orleans, LA. (January 28, 2018).

Sones, J., "Equine Placental Microbiome," Southwest Veterinary Symposium, San Antonio, TX. (September 28, 2019).

Sones, J., "Endocrinology of pregnancy in the mare," Southwest Veterinary Symposium, San Antonio, TX. (September 28, 2019).

Sones, J., "Problems of Pregnancy in the Mare," Southwest Veterinary Symposium, San Antonio, TX. (September 28, 2019).

Steiner, M, Patton, M, Bell, H, da Cunha, A, Mitchell, C, Fugler, L, Leise, B. National Veterinary Scholars Symposium, "The use of liposomal bupivacaine as an incisional analgesic and its effects on wound healing", Worcester, MA. (July 2019).

Andrews, Frank M (PI), Chapman, Ann M, “A dose-ranging pilot clinical trial to assess the effectiveness and field safety of Esomeprazole for the treatment of Equine Gastric Ulcer Syndrome (EGUS),” Sponsored by Kindred BioScience, Private, \$221,490. (April 2016 - Present).

Andrews, Frank M (PI), Riggs, Laura M, Lopez, Mandi J, “Effect of an Oral Supplement Containing Curcumin Extract (Longvida) on Lameness due to Osteoarthritis or Degenerative Disease and Gastric Ulcer Scores,” Sponsored by W. F. Young Company, Private, \$161,131. (June 2016 - July 2018).

Andrews, Frank M (PI), Chapman, Ann M, “Efficacy & Safety Field Study of Ciclesonide for Horses with Recurrent Airway Obstruction (RAO) and/or Summer Pasture Associated Obstructive Pulmonary Disease (SPAOPD),” Sponsored by Boehringer Ingelheim Vetmedica, Private, \$40,000. (September 2016 - June 2018).

Andrews, Frank M (PI), “Pivotal Study: A 2-Period Crossover Bioequivalence Study Comparing Gastrogard Paste Formulation of Omeprazole (NADA 141-123) Versus a Generic Omeprazole Formulation when Administered Orally in Horses,” Sponsored by Randlab Pty, Ltd., 7/85 Alfred Road, Chipping Norton, NSW, Australia 2170, Private, \$159,703. (September 2016 - December 2017).

Andrews, Frank M (PI), “Gastroscope Instructional Video,” Sponsored by Randlab Pty, Ltd., 7/85 Alfred Road, Chipping Norton, NSW, Australia 2170, Private, \$10,300. (December 2016 - February 2017).

Andrews, Frank M (PI), Riggs, Laura M, Lopez, Mandi J, “Effect of an Oral Supplement Containing Curcumin Extract (Longvida) on Lameness due to Osteoarthritis or Degenerative Disease and Gastric Ulcer Scores,” Sponsored by W. F. Young Company, Private, \$161,131. (June 2016 - Present).

Andrews, Frank M (PI), Chapman, Ann M, “A dose-ranging pilot clinical trial to assess the effectiveness and field safety of Esomeprazole for the treatment of Equine Gastric Ulcer Syndrome (EGUS),” Sponsored by Kindred BioScience, Private, \$221,490. (April 2016 - Present).

Andrews, Frank M (PI), Chapman, Ann M, “Efficacy & Safety Field Study of Ciclesonide for Horses with Recurrent Airway Obstruction (RAO) and/or Summer Pasture Associated Obstructive Pulmonary Disease (SPAOPD),” Sponsored by Boehringer Ingelheim Vetmedica, Private, \$40,000. (September 2016 - June 2018).

Andrews, Frank (PI), Chapman, Ann M, Leise, Britta, Riggs, Laura, Mitchell, Colin, McCauley, Charles, Mirza, Mutajab, “A Multi-Center Study to Evaluate the Effectiveness and Field Safety of Hyaluronate Sodium for the Control of Clinical Signs Associated with Osteoarthritis in Horses,” Sponsored by Dechra Limited, Private. (January 2019 – December 2020).

Baker, Rose, Andrews, Frank M (PI), Leise, Britta, Patton, Molly, “Bit Chewing and its Effects on Gastrointestinal Sounds and Transit Time in Horses with Colic,” Sponsored by Equine Health Studies Program, Louisiana State University. (October 2018 – July 2019).

Baker, Rose, Andrews, Frank M (PI), Leise, Britta, Patton, Molly, “Effects of Bit Chewing on Borborygmi and Transit Time in horses,” Sponsored by Equine Health Studies Program, Louisiana State University. (October 2018 – July 2019).

Banse, Heidi, McMillan, Chantal, Ungrin, Mark, Read, Matt, Hecker, Kent, Skorobahach, Brian, Kondro, Doug, “Simulated ophthalmoscopy model: validity and cognitive task analysis,” Sponsored by University of Calgary Veterinary Education Research Fund, Local, \$9,400. (May 2016 - Present).

Banse, Heidi (PI), McFarlane, Dianne, "Impact of Prascend® on regulation of skeletal muscle protein metabolism in PPID-associated muscle atrophy.," Sponsored by Boehringer-Ingelheim, Private, \$20,900. (February 2015 - Present).

Banse, Heidi (PI), Pedersen, Sarah, French, Dan, Read, Emma, Cribb, Alastair, "Impact of phenylbutazone on prostaglandin concentration in equine gastric glandular mucosa," Sponsored by University of Calgary Clinical Research Fund, Local, \$15,337. (October 2014 - Present).

Banse, Heidi, Chelikani, Prasanth, "Regulation of protein metabolism in muscle atrophy of horses with pituitary-pars intermedia dysfunction," Sponsored by University Research Grants Committee, University of Calgary, Local, \$15,000. (2014 - Present).

Banse, Heidi (PI), Levy, Michel, Smits, Judit, Chrenek, Alycia, Crosby, Candice, "Seasonal regulation of hair cortisol concentration in horses with pituitary pars intermedia dysfunction," Sponsored by University of Calgary Clinical Research Fund, Local, \$18,350. (November 2015 - October 2017).

Banse, Heidi (PI), Andrews, Frank M, Watanabe, Tatiane, Del Piero, Fabio, "Characterization of inflammation in equine glandular gastric disease," Sponsored by USDA-1433, Louisiana State University, \$7,000. (October 1, 2018 - Present).

Banse, Heidi, Paul, Linda, Andrews, Frank M, Ericsson, Aaron, "Comparison of the gastric microbiome in horses with and without equine glandular gastric disease," Sponsored by Equine Health Studies Program, Louisiana State University, \$5,000. (July 2018 - June 2019).

Banse, Heidi (PI), Chapman, Ann M, Andrews, Frank M, "Effects of two formulations of omeprazole compared to placebo on gastric pH and gastric lesion scores," Sponsored by Equine Health Studies Program, Louisiana State University, \$10,000. (July 2018 - June 2019).

Banse, Heidi (PI), Chapman, Ann M, Fletcher, Jon M, "Stability of ACTH in frozen equine plasma," Sponsored by Boehringer-Ingelheim, Private, \$13,125. (May 2018 - Present).

Banse, Heidi, McMillan, Chantal, Ungrin, Mark, Read, Matt, Hecker, Kent, Skorobahach, Brian, Kondro, Doug, "Simulated ophthalmoscopy model: validity and cognitive task analysis," Sponsored by University of Calgary Veterinary Education Research Fund, Local, \$9,400. (May 2016 - May 2018).

Banse, Heidi, Paul, Linda, Andrews, Frank M, Ericsson, Aaron, "Comparison of the gastric microbiome in horses with and without equine glandular gastric disease," Sponsored by Equine Health Studies Program, Louisiana State University, \$5,000. (July 2018 - June 2019).

Banse, Heidi (PI), Paul, Linda, Andrews, Frank M, Aaron Ericsson, "Comparison of the gastric microbiome in horses with and without EGGD: a field study," Sponsored by Boehringer Ingelheim Animal Health, Private, \$64,647. (December 2019 - Present).

Chapman, Ann M, Oberhaus, Erin L, Thompson, Donald, "Evaluation of the effects of sedation on endocrine responses to thyrotropin-releasing hormone, gonadotropin-releasing hormone and assessments of insulin sensitivity in mares," Sponsored by EHSP Charles V. Cusimano Research Grant, \$10,000. (August 2018 - July 2020).

Francis, Joseph (PI), Chapman, Ann M, Andrews, Frank M, "Exploring beneficial effects of blueberries in horses: Effect of blueberries on Exercise Testing in horses on the Treadmill," Sponsored by Blueberry Growers of America, Private, \$62,208. (September 2016 - June 2018)

Francis, Joseph (PI), Chapman, Ann M, Andrews, Frank M, “Exploring beneficial effects of blueberries in horses: Effect of blueberries on Exercise Testing in horses on the Treadmill,” Sponsored by Blueberry Growers of America, Private, \$62,208. (September 2016 - June 2018).

Gomes, V., Magee, C., Sones, J.L. “Kisspeptins as pro-apoptotic mediators during equine endometrial cup demise”, Sponsored by Theriogenology Foundation, \$5000 (2020-present).

Gomes, V., Sones, J. L. “Effects of kisspeptin-10 on in vitro migration and secretory activity of invasive equine chorionic girdle trophoblast cells,” Sponsored by Veterinary Clinical Sciences Competitive Research Program, \$4000. (2019 – present).

Leise, Britta S (PI), “Assessment of keratinocyte wound healing and growth factor production in vitro after exposure to bone marrow derived mesenchymal stem cells or lipopolysaccharide,” Sponsored by Charles V. Cusimano EHSP Research Grant, Louisiana State University, \$11,617. (June 2016 – June 2018).

Leise, Britta, Cruz-Sanabria, J, Gaschen, Lorrie, Bragulla, H, “Development of a cervical injection technique in the horse,” Sponsored by Charles V. Cusimano EHSP Research Grant, \$5,874. (July 2017 - September 2019).

Leise, Britta (PI), Fugler, L A, “Assessment of plasma F-actin and gelsolin concentrations in horses administered lipopolysaccharide and pentoxifylline,” Sponsored by Charles V. Cusimano EHSP Research Grant, \$12,000. (July 2017 – December 2019).

Leise, Britta (PI), Fugler, LA, “Immunolocalization and expression of small leucine-rich proteoglycans in models of sepsis related laminitis,” Sponsored by LSU-SVM Competitive Research Program, \$8,500. (July 2017 – July 2019).

Leise, Britta (PI), Fugler, Lee Ann, “Evaluation of neuropathic pain mediators in acute and chronic laminitis,” Sponsored by LSU-SVM Competitive Research Program, USDA 1433, Federal, \$7,500. (October 2019 - Present).

Leise, Britta (PI), Riggs, Laura M, McCauley, Charles T, Aguilar, Carlos, Guerrero-Plata, M Antonieta, “Ex Vivo determination of platelet activation via flow cytometry and growth factor production in synovial fluid from osteoarthritic and non-osteoarthritic joints of horses,” Sponsored by ACVS Foundation Diplomate Clinical Research Grant, Private. \$9,937. (May 2019 - Present).

Leise, Britta (PI), Steiner, Morgan, Mitchell, Colin F, da Cunha, Anderson F, Fugler, Lee Ann, Patton, Molly, “The use of liposomal bupivacaine as an incisional analgesic and its effects on wound healing,” Sponsored by LSU-SVM, NIH, Merial Summer Scholar Program, \$6,211. (May 2019 – August 2019).

Leise, Britta, “Method of producing hyaluronic acid and other value-added products from alligator byproducts,” Sponsored by Alligator Products Industry Fund, Private, \$62,083. (April 2019 - Present).

Lopez, Mandi J (PI), Yang, Qingqiu, “Characterization of adult equine stem cells from normal and laminitic hooves,” Sponsored by USDA, Federal, \$7,500. (October 2016 - September 2017).

Lopez, Mandi J (PI), Yang, Qingqiu, Takawira, Catherine, “Isolation and characterization of adult equine stem cells from normal and laminitic hooves,” Sponsored by LSU Equine Health Studies Program, Local, \$6,000. (September 2016 - July 2017).

Lopez, Mandi J (PI), “GrabTen - Innovative soft tissue tensioning and fixation device,” Sponsored by LSU Board of Supervisors LIFT2, State, \$36,783. (March 2015 - September 2017).

Lopez, Mandi J (PI), Duan, Wei, "Identification of a synergistic cell immunophenotype to augment de novo bone generation by equine adipose derived multipotent stromal cells," Sponsored by LSU Equine Health Studies Program, Local, \$8,000. (September 2016 - June 2017).

Lopez, Mandi J (PI), Yang, Qingqiu, Wang, Pengju, Takawira, Catherine, "Quantification of Bone Motion in Normal and Laminitic Equine Hooves to Design and Optimize Stabilization Strategies," Sponsored by SVM CORP, USDA 1433, Local, \$7,500. (October 2017 - September 2018).

Lopez, Mandi J, Wang, P, "Equine Multipotent Stromal Cell Immobilization by Self-Assembling Peptide Scaffolds," Sponsored by LSU Equine Health Studies Program, Local, \$6,000. (July 2017 - June 2018).

Lopez, Mandi J, Yang, Q, "Investigation of Decellularized Equine Hoof Tissue Scaffold to Direct Stem Cells," Sponsored by LSU Equine Health Studies Program, Local, \$6,000. (July 2017 – June 2018).

Lopez, Mandi J (PI), "Hybrid Synthetic/Biological Scaffolds for Complex Orbital Reconstruction," Sponsored by Johns Hopkins University, Private, \$133,797. (September 2018 - Present).

Lopez, Mandi J (PI), Andrews, Frank M, Taguchi, Takashi, "Efficacy and Safety of Oral Agmatine and Curcumin for Equine Lameness Associated with Osteoarthritis," Sponsored by SVM Corp USDA 1433, Federal, \$7,490. (October 2018 - September 2019).

Lopez, Mandi J (PI), Andrews, Frank M, Taguchi, Takashi, "Efficacy and Safety of Oral Agmatine and Curcumin for Equine Lameness Associated with Osteoarthritis," Sponsored by LSU Equine Health Sciences Program, Louisiana State University, \$6,000. (September 2018 – June 2019).

Lopez, Mandi J (PI), Wang, Pengju, "Development of a Biomechanics Model to Qualify Horse Back Force by Using Inverse Dynamic Analysis of Horse Gait," Sponsored by LSU Equine Health Studies Program, Louisiana State University, \$3,000. (September 2018 - June 2019).

Lopez, Mandi J (PI), Yang, Qingqiu, "Epithelial – Mesenchymal Transition: A New Target for Equine Laminitis Research," Sponsored by LSU Equine Health Studies Program, Louisiana State University, \$5,000. (September 2018 - June 2019).

Lopez, Mandi J (PI), DeRouen, Abigail, "Stem Cells from Laminitic Equine Hooves Have Lower Expansion Capacity and Plasticity Than Those from Unaffected," Sponsored by Merial Summer Scholars Program, Private, \$5,000. (May 2018 - June 2019).

Lopez, Mandi J (PI), "Hernia Prevention with AmnioFix," Sponsored by LSU Health Sciences Center, State, \$6,000. (February 2018 - February 2019).

Lopez, Mandi J (PI), "Tynewald Foundation Regenerative Medicine Fund," Sponsored by Tynewald Foundation, Private, \$136,000. (December 2019 - Present).

Lopez, Mandi J (PI), Taguchi, Takashi, "Implantable Collagen Constructs for Equine Tendon Regeneration," Sponsored by SVM Corp USDA 1433, Federal, \$7,468. (October 2019 - Present).

Lopez, Mandi J (PI), Taguchi, Takashi, "Implantable Collagen Constructs for Equine Tendon Regeneration," Sponsored by LSU Equine Health Studies Program, Louisiana State University, \$9,530. (September 2019 - Present).

Lopez, Mandi J (PI), “Evaluation of Partial Depth Pavement Repairs on Routes Heavily Traveled by Amish Horse and Buggies-Phase 2,” Sponsored by Ohio University, State, \$27,000. (January 2019 - Present).

McCauley, Charles T (PI), DiGiovanni, Daria, Gaschen, Lorrie, Riggs, Laura M, Mitchell, Colin F, Burba, Daniel J, Mirza, Mustajab H, “The Effect of Neurectomy of the Deep Branch of the Lateral Plantar Nerve on the Biomechanical Properties and Diagnostic Imaging Characteristics of the Equine Hind Suspensory Ligament,” Sponsored by Charles V. Cusimano EHSP, Louisiana State University, \$11,998. (October 2014 - Present).

McCauley, Charles T, Di Giovanni, Daria, Riggs, Laura, Mitchell, Colin, Burba, Dan, Mirza, Mustajab, Del Piero, Fabio, “Histologic Changes to the Muscular Portion of the Hind Suspensory Ligament of Horses as a Result of Neurectomy of the Deep Branch of the Lateral Plantar Nerve,” Sponsored by Charles V. Cusimano EHSP Grant, Louisiana State University, \$1,340. (September 2014 - Present).

McCauley, Charles T, DiGiovanni, Daria, Riggs, ILura, Mitchell, Colin, Burba, Dan, Mirza, Mustajab, Gaschen, Lorrie, “The Effect of Neurectomy of the Deep Branch of the Lateral Plantar Nerve on the Biomechanical Properties and Diagnostic Imaging Characteristics of the Equine Hind Suspensory Ligament,” Sponsored by Charles V. Cusimano EHSP Grant, Louisiana State University, \$11,998. (September 2014 - Present).

McConnico, Rebecca S (PI), Mirza, Mustajab H, Duhon, Brandy, Wolfson, Wendy, “Medical support for equine flood victims in Louisiana,” Sponsored by May HTR Foundation, Private, \$14,480. (September 2016 - September 2017).

McConnico, Rebecca S (PI), Poirrier, Renee, Littlefield, Martha, Wolfson, Wendy, Mirza, Mustajab H, “Support to purchase equipment for animal response - Great Flood of 2016,” Sponsored by ASPCA, Private, \$10,000. (September, 2016 - August 2017).

McConnico, Rebecca S (PI), Mirza, Mustajab H, “Support for CE/professional Course in Large animal handling and technical large animal emergency rescue,” Sponsored by American Association of Equine Practitioners, Private, \$3,000. (September 2016 - June 2017).

Mitchell, Colin F (PI), McNulty, Margaret A, “Influence of clodronate on bone density and bone formation in young horses,” Sponsored by Equine Health Studies Program, Louisiana State University, \$12,000. (August 2015 - June 2018).

Mitchell, Colin F (PI) Leise, Britta, Krueger, Clarisa. “Pharmacokinetics of clodronate disodium in plasma and synovial fluid following intramuscular administration in adult horses.” Sponsored by Charles V. Cusimano Equine Health Studies Program Research Grant. \$11,965. (July 2017-July 2019)

Mitchell, Colin (PI), Krueger, Clarisa (PI), Leise, Britta. “Effects of systemic clodronate disodium administration on renal excretion patterns in healthy adult horses.” Sponsored by Charles V. Cusimano Equine Health Studies Program Graduate Student Research Grant. (July 2017-July 2019) \$5,000.

Mitchell, Colin (PI), McNulty, Margaret (PI), Allen Matt. “Effect of tiludronate on bone remodeling and regeneration in horses”. Sponsored by the Morris Animal Foundation \$116,707 (July 2019-present).

Paul, Linda (PI), Banse, Heidi, Andrews, Frank M, Ericsson, Aaron, “Impact of phenylbutazone and phenylbutazone plus omeprazole on the gastric microbiome of horses,” Sponsored by EHSP Charles V. Cusimano Research Grant (LSU SVM), Louisiana State University, \$4,600. (August 2019 - Present).

Oberhaus, E., Sones, J.L. “Hormonal induction of early cyclicity in seasonally anovulatory equids”, Sponsored by Audubon Center for Research of Engaged Species, \$47,471 (2018 – 2019).

Riggs, Laura M, Grimes, Janet A, Hodgson, Michelle, “Effect of multiple sterilizations on biomechanical properties of surgical screws,” Sponsored by VCS Corp grant, Louisiana State University. (October 2015 - Present).

Riggs, Laura (PI), Sandow, Cole, “Comparison of Compressive Forces in Simulated Medial Condylar Fractures of the Equine Third Metacarpus Using 4.5 mm, 4.5 mm Self-Tapping and 5.5 mm AO Cortical Screws,” Sponsored by American College of Veterinary Surgeons, Private. (May 2018 – June 2019).

Riggs, Laura M, Aguilar, Carlos Leise, Britta, McCauley, Charles T, “Evaluation of activation of platelet rich plasma in the presence of equine synovial fluid from osteoarthritic joints.,” Sponsored by Charles V. Cusimano EHSP Research Grant, Louisiana State University, \$5,000. (July 2018 – July 2020).

Riggs, Laura M (PI), Leise, Britta S, McCauley, Charles T, Aguilar, Carlos, “Evaluation of anti-inflammatory properties and growth factor release after repeated injections in horses with early-moderate osteoarthritic joints,” Sponsored by LSU-VCS CORP, Louisiana State University, \$3,850. (September 2018 – July 2020).

Riggs, Laura M (PI), Leise, Britta, McCauley, Charles T, Aguilar, Carlos, “Evaluation of anti-inflammatory properties and growth factor release after repeated intra-articular injections of leukocyte-poor platelet rich plasma in horses with early-moderate osteoarthritic joints,” Sponsored by Charles V. Cusimano EHSP Research Grant, \$10,000. (July 2018 – July 2020).

Sones, Jennifer, Leisinger, Chelsey (PI), “Characterization of steroid hormone responsive genes in the equine endometrium during induced aluteal cycles,” Sponsored by Veterinary Clinical Sciences, LSU SVM, Louisiana State University. (October 2016 - Present).

Sones, Jennifer, Leisinger, Chelsey (PI), “Developmental characteristics of in vivo equine embryos produced during induced aluteal cycles,” Sponsored by Equine Health Studies Program, LSU SVM, Louisiana State University, \$6,000. (August, 2016 - Present).

Sones, Jennifer, Beavers, Kelli (PI), “Measurement of serum amyloid A levels in clinical cases of equine placentitis.,” Sponsored by Equine Health Studies Program, LSU SVM, Louisiana State University, \$6,000. (August 2016 - June 2017).

Sones, Jennifer (PI), Heil, Babiche, King, Gary, “Metagenetic characterization of the resident uterine microbiome in the horse.,” Sponsored by Equine Health Studies Program, Louisiana State University, \$12,000. (August 2017 - June 2019).

Andrews, Frank (LVMA Equine Committee Professor and EHSP Director)

Faculty Distinguished Scholar Award, 2018, LSU School of Veterinary.

Dean's Teacher Merit Honor Roll Year IV, Louisiana State University, School of Veterinary Medicine 2018.

Armstrong, Chance L. (Assistant Professor)

Texas Veterinary Medical Reserve Corps Challenge Coin Awardee, TVMRC (October 1, 2017)

Dean's Teacher Merit Honor Roll Year IV, Louisiana State University-School of Veterinary Medicine (April 2017)

Special Congressional Recognition, United States House of Representatives (May 2018)

The HALTER Project Community Preparedness Hero Partner, Halter Project; Louisiana State Animal Response Team (May 2018)

Dean's Teacher Merit Award Year III, Louisiana State University School of Veterinary Medicine (April 2018)

Dean's Teacher Merit Honor Roll, Louisiana State University-School of Veterinary Medicine (April 2019)

Baker, Rose E. (Assistant Professor)

Dean's Teacher Merit Honor Roll, LSU SVM (2019)

Banse, Heidi E. (Assistant Professor)

Dean's Merit Honor Roll (3rd Year), LSU SVM (April 2018)

Dean's Merit Honor Roll (2nd, 3rd, 4th year) (April 2019)

Carter, Renee T. (Associate Professor)

Dean's Teacher Merit Honor Roll, LSU School of Veterinary Medicine (2017)

Outstanding Service Award, LSU School of Veterinary Medicine (2017)

Dean's Teacher Merit Honor Roll, LSU School of Veterinary Medicine (2018)

Outstanding Teacher Award, Class of 2018 (March 2018)

Dean's Teacher Merit Honor Roll, LSU School of Veterinary Medicine (May 2019)

Chapman, Ann M. (Associate Professor)

Dean's Teacher Merit Honor Roll, Louisiana State University, School of Veterinary Medicine (April 2017)

Dean's Teacher Merit Honor Roll, Louisiana State University, School of Veterinary Medicine (May 2019)

Cremer, Jeannette (Assistant Professor)

Dean's Teacher Merit Honor Roll (Years III and IV) (April 2017)

Dean's Teacher Merit Honor Roll (Years II and IV) (April 2018)

Dean's Teacher Merit Honor Roll (Year IV) (May 2019)

Gaschen, Lorrie (Professor)

Dean's Teacher Merit Honor Role Year 3, LSU SVM (December 2017)

Dean's Teacher Merit Honor Role Year 3, LSU SVM (December 2018)

Dean's Teacher Merit Honor Role Year 1,3, 4, LSU SVM (December 2019)



HONORS AND AWARDS

Granger, Abbi A. (Associate Professor)

Dean's Teacher Merit Honor Roll (Year 1), LSUSVM (April 2017)
Dean's Teacher Merit Honor Roll (Year 2), LSUSVM (April 2017)
Dean's Teacher Merit Honor Roll (Year 1), LSUSVM (April 2018)
Dean's Teacher Merit Honor Roll (Year 2), LSUSVM (April 2018)
Dean's Teacher Merit Honor Roll (Year 1), LSUSVM (April 2019)
Dean's Teacher Merit Honor Roll (Year 3), LSUSVM (April 2019)
Poster presentation award - second place, Phi Zeta Scientific Poster presentation program (February 2019)

Lopez, Mandi J. (Professor)

Excellence in Innovation Award, Louisiana State University (May 2017)
Subject of National Publication Cover Story, Veterinarian's Money Digest (April 2017)
National Academy of Inventors Fellow, National Academy of Inventors (April 2017)
Faculty Distinguished Scholar Award, LSU School of Veterinary Medicine (March 2017)
Certificate, Southeastern Conference Academic Leadership Development Program (February 2017)
Top Cited Article 2018-2019, Wiley (December 2019)
Recognition of Patent Issue - 9,872,760, Office of Innovation and Technology Commercialization (April 2019)

Magee, Aliya N. (Assistant Professor)

Dean's Teacher Merit Honor Roll, LSU SVM (April 2017)
Dean's Teacher Merit Honor Roll, LSU SVM (April 2018)
Dean's Teacher Merit Honor Roll, LSU SVM (May 2019)

McCauley, Charles T. (Assistant Professor)

Class of 2018 Outstanding Teacher Award, Class of 2018 (April 2017)

Mirza, Mustajab H. (Associate Professor)

The Halter Project "Community Preparedness Hero Partner", LSART (May 2018)
Newly promoted Faculty, LSU (May 2018)
Teachers merit award, Class of 2019 (May 2019)

Mitchell, Colin F. (Professor)

Dean's Teacher Merit Honor Roll, LSU SVM (May 2017)
Dean's Teacher Merit Honor Roll, LSU SVM (April 2018)
Dean's Teacher Merit Honor Roll, LSU SVM (April 2019)

Pucheu-Haston, Cherie M. (Associate Professor)

Dean's Teacher Merit Honor Roll, LSU SVM (April 2017)

Dean's Teacher Merit Honor Roll, LSU SVM (May 2018)

Dean's Teacher Merit Honor Roll, LSU SVM (May 2019)

Queiroz-Williams, Patricia (Associate Professor)

Dean's Teacher Merit Honor Roll, LSU School of Veterinary Medicine (May 2017)

Dean's Teacher Merit Honor Roll, LSU School of Veterinary Medicine (May 2018)

Rademacher, Nathalie (Associate Professor)

LSU 10 years of Service Award (January 2017)

Dean's Teacher Merit Honor Roll, LSU Year IV students (April 2018)

Riggs, Laura M. (Associate Professor)

Dean's Teacher Merit Honor Roll, LSU SVM (May 2017)

Dean's Teacher Merit Honor Roll, LSU SVM (May 2018)

Dean's Teacher Merit Honor Roll, LSU SVM (May 2019)

Scully, Clare M. (Assistant Professor)

Dean's Teacher Merit Honor Roll, LSUSVM (February 2017)

Dean's Teacher Merit Honor Roll, LSUSVM (February 2018)

Dean's Teacher Merit Honor Roll, LSUSVM (February 2019)

Sones, Jenny L. (Assistant Professor)

Theriogenology Foundation New Faculty Travel Grant, Theriogenology Foundation (July 2017)

Dean's Teacher Merit Honor Roll, LSU SVM (April 2017)

Stephanie Watts Career Development Award, American Heart Association (September 2018)

Dean's Teacher Merit Honor Roll, LSU SVM (April 2018)

Dean's Teacher Merit Honor Roll, LSU SVM (May 2019)

Welborn, Matt G. (Professor)

2017 Dean's Teacher Merit Honor Role, LSU SVM (April 2017)

2017 Dean's Teacher Merit Honor Role, LSU SVM (April 2017)

Halter Project Community Preparedness Hero Partner, Halter Project (May 2018)

2018 Dean's Teacher Merit Honor Role, LSU SVM (April 2018)

2019 Dean's Teacher Merit Honor Role, LSU SVM (May 2019)



FACILITIES AND EQUIPMENT

State-of-the-Art Facilities and Equipment

The Equine Health Studies Program is an interdepartmental, multidisciplinary equine biomedical program within the LSU School of Veterinary Medicine that is dedicated to the health, well-being, and performance of horses through veterinary research, education, and service. A diverse group of faculty, graduate students, post-doctoral fellows, and staff conduct cutting-edge research in equine health and disease. The program maintains a herd of approximately 90 horses and ponies for teaching and research. Three research barns in the facility contain over 40 stalls and several pastures and paddocks are available for turnout and housing. We have upgraded and added some key facilities and equipment, including the renaming and dedication of the EHSP physiology and pharmacology laboratory as the Charles V. Cusimano Equine Physiology and Pharmacology Laboratory and the updating of the Equine Performance Evaluation Laboratory and Lameness Pavilion, the Equine Cell and Tissue Culture Laboratory, the Laboratory for Equine and Comparative Orthopedic Research, and the Equine Molecular Laboratory. Additionally, the clinical facilities and equipment within the Veterinary Teaching Hospital and other core research facilities and resources within the LSU SVM support the research activities of the EHSP.

Charles V. Cusimano Equine Physiology and Pharmacology Laboratory

Numerous faculty and graduate students conduct scientific investigations involving equine physiology, pharmacology, and pathophysiology, including but not limited to vascular and nonvascular smooth muscle physiology, pathology, and pharmacology (digital and intestinal vasculature, bronchial, uterine and intestinal smooth muscle), mucosal injury due to non-steroidal-anti-inflammatory drugs, mucosal physiology and permeability, endotoxemia, laminitis, and development and testing the effects of medications on hemodynamics. We currently have 15 Ussing chambers systems and multiple tissue baths for measuring gastrointestinal mucosal permeability and injury and muscular contraction.



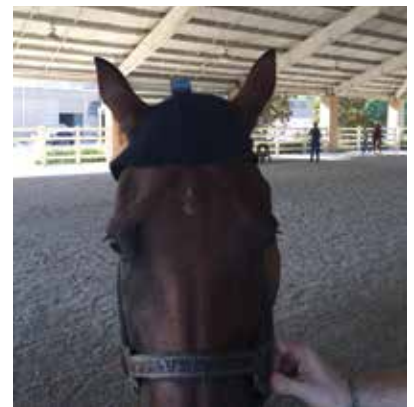
FACILITIES AND EQUIPMENT

Pfeiffer-Burt Lameness and Performance Pavilion

The Pfeiffer-Burt Lameness and Performance Pavilion (75' x 125') is a modern facility for evaluation of locomotion in horses. Several research projects evaluating the efficacy of pharmaceutical and nutraceutical agents and feed additives for treatment of lameness in horses are being evaluated in this facility.



Force Plate Analysis in the Pfeiffer-Burt Lameness and Performance Pavilion





FACILITIES AND EQUIPMENT

Equine Performance Evaluation Laboratory

The Equine Performance Evaluation Laboratory (EPEL) is equipped with a high-speed treadmill for exercising horses at speeds that mimic racing conditions. A Coda Motion System digital motion analysis system that incorporates markers on the horse into digital images to evaluate gait and lameness is also available (see image below). Evaluation of the dynamics of the upper airway can be achieved by a dynamic endoscopic system. The dynamic endoscope can evaluate the upper airway in research and clinic horses exercising on the high-speed treadmill or working in their natural environment, such as the racetrack or riding arena.



Dynamic Endoscope

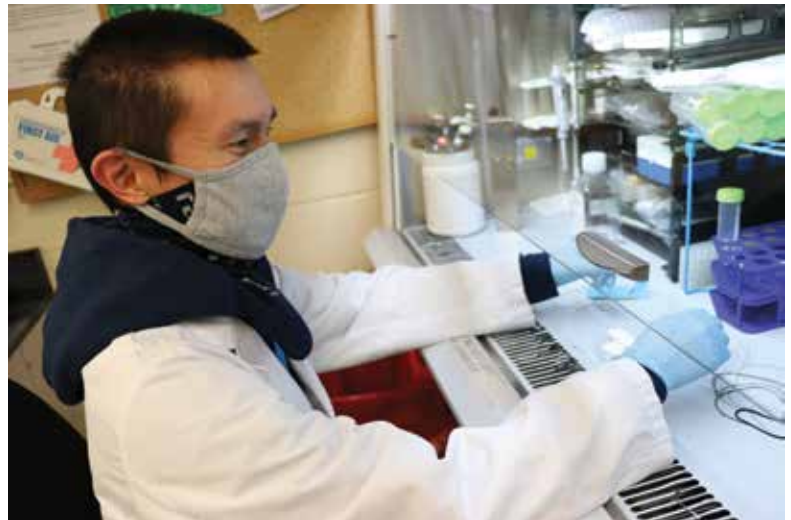


FACILITIES AND EQUIPMENT

Laboratory for Equine and Comparative Orthopedic Research

The Laboratory for Equine and Comparative Orthopedic Research (LECOR) was established and designed to facilitate a strong association between clinical and basic orthopedic research for advancement of orthopedic knowledge across species and disciplines. LECOR is specifically designed and equipped for translational orthopedic research from the molecular/genetic level to the structural level.

The laboratory is equipped with the most modern equipment for molecular/genetic work, including an MJ Research Chromo4 Detector and DNA Engine 200 for DNA fragment amplification and Quantitative PCR, a UVP Hybrilinker for blot analysis and a Synergy HT multi-detection microplate reader for ELISA assays. Housed within the laboratory is a Leica DM 4000 light microscope with fluorescent, polarizing, and phase contrast capabilities. The microscope is equipped with the latest in digital image capture equipment and software. Additionally, there is a PathScan Enabler to obtain ultra high quality images from 1 x 3 inch glass slides. A custom-designed servohydraulic axial torsional Material Testing System with a Flex Test SE Controller and equipped with a Multiple Gage Length Axial Extensometer makes nearly any level of mechanical tissue testing possible, from the tissue and bone level to joint and whole limb testing. Presently, several state-of-the-art diamond saws are available for both orthopedic hard and soft tissue microscopic and ultrastructural sample preparation. A section of the laboratory is devoted to histologic preparation of both calcified and decalcified tissue samples. Areas of research focus include the pathophysiology of hip dysplasia, the development and implementation of novel orthopedic devices and cranial cruciate ligament disease. Also, the laboratory is active in equine stem cell research, regenerative medicine and tissue culture. The laboratory focuses on translation of basic scientific research to the live horse. Projects within the laboratory include growth of lamellar cells for use as an in vitro model of laminitis and bone marrow stem cells for use in tendon healing.





FACILITIES AND EQUIPMENT

Equine Orthopedics and Biomechanics

We have developed a solid research program in the area of equine orthopedics and biomechanics. This has led to the development of numerous orthopedic implants designed specifically for equine use, which is critical for the advancement of equine orthopedics and fracture repair. These equine specific orthopedic implants have distinct advantages over those intended for human application. The EHSP is unique in that it is part of the only school of veterinary medicine in the country that is designing and testing equine specific orthopedic implants. An integral part of this research program was the development of a finite element computer model that allows for the biomechanical testing of an orthopedic implant applied to an equine bone or bones. This allows for changes in implant design to be made and tested using the finite element model prior to in vitro biomechanical testing. This computer aided design approach allows for more efficient use of the limited cadaver specimens. This research has direct and often immediate clinical applications. We are presently advising and performing biomechanical tests on prototype large animal orthopedic implants for Synthes Vet, Inc., Innovative Animal Products, and IMEX Veterinary, Inc.



Clinical Facilities and Equipment

The LSU Veterinary Teaching Hospital is staffed 24/7, 365 days a year with board certified and internationally recognized veterinary specialists and highly-skilled veterinary technicians who provide clinical service to the horse-owning public.

Computed Tomography

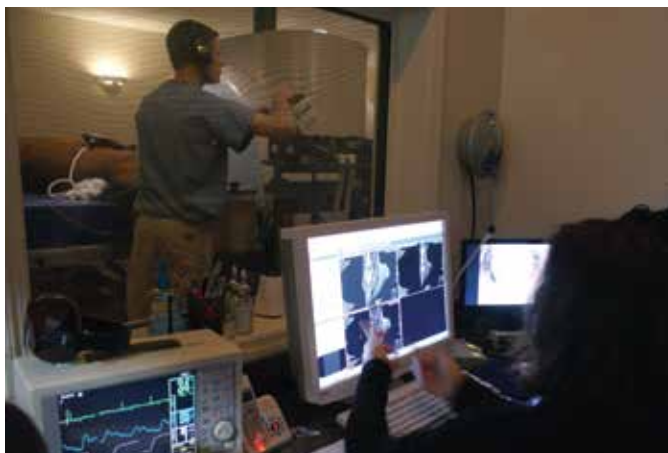
The Veterinary Teaching Hospital's Diagnostic Imaging Service is equipped to provide its patients with clinical diagnostic imaging. On-site diagnostic imaging includes computed tomography, as well as Large and Small Animal radiography, digital fluoroscopy, ultrasonography, magnetic resonance imaging, and nuclear scintigraphy.



FACILITIES AND EQUIPMENT

MRI Unit

In 2009, the LSU Veterinary Teaching Hospital added a state-of-the-art MRI unit for evaluation of soft tissue and bony lesions in the head, neck, and limbs of horses with hard to diagnose clinical conditions, including foot and lower limb lameness.



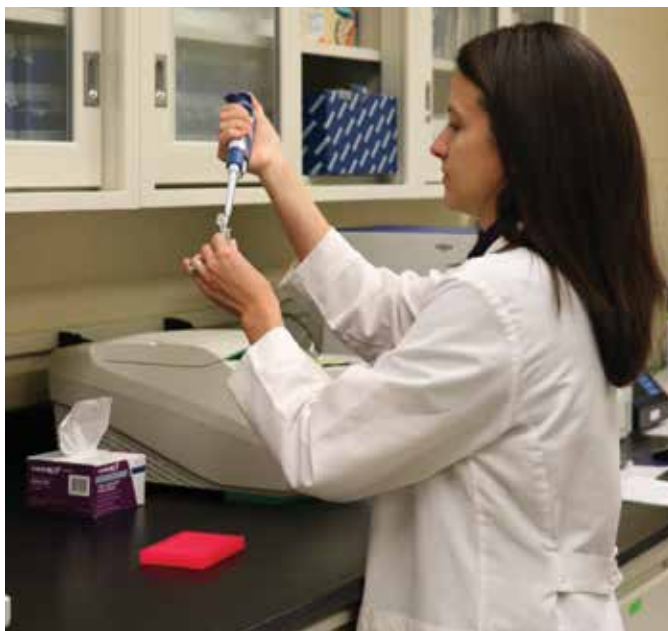
Diagnostic and Research Endoscopy

The hospital also has digital endoscopy equipment (Karl Storz, Inc.) to diagnose conditions of the upper and lower airways, esophagus, stomach, proximal duodenum, and reproductive tract.



Equine Reproduction/Theriogenology Laboratory

The Equine Reproduction/Theriogenology Laboratory has complete facilities for the evaluation, chill-transport, and cryopreservation of spermatozoa, including light and phase-contrast microscopes and a computer-assisted spermatozoal analysis system (Spermvision®). There are three ultrasound machines with 5-7.5 MHz linear array transducers and a 5-7.5 MHz sector array transvaginal transducer for oocyte collection by follicular aspiration or twin reduction by aspiration. A fourth ultrasound system equipped with a 3.5 sector and 5-7.5 microconvex array is available for transabdominal imaging. An Olympus endoscope is also available for hysteroscopic examination and for hysteroscopic low-dose insemination. Various laparoscopic reproductive procedures are available.





FACILITIES AND EQUIPMENT

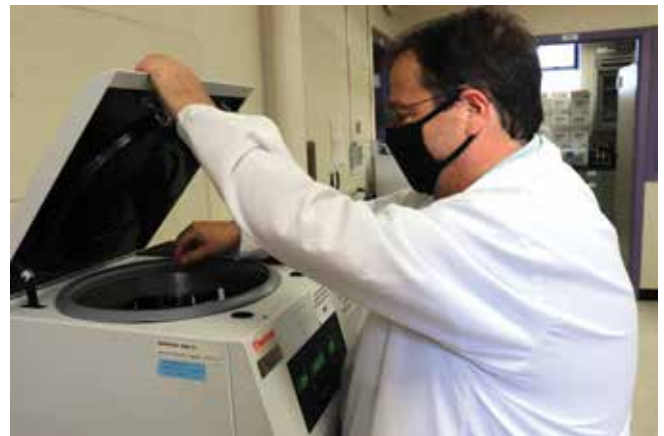
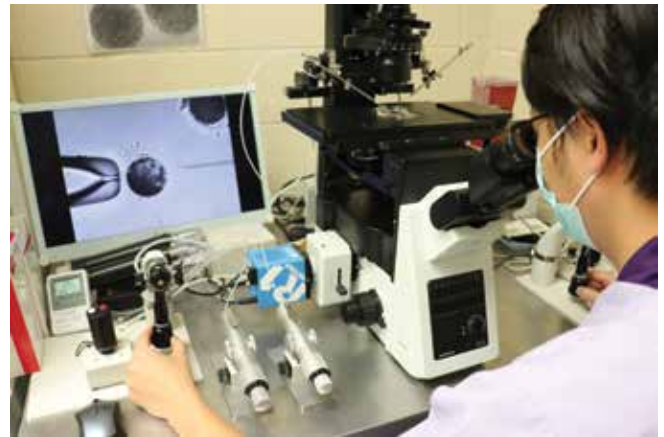
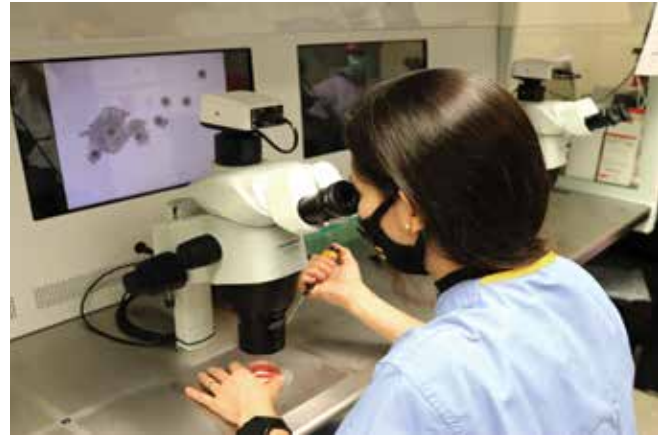
Comparative In Vitro Fertilization Laboratory

The comparative in vitro fertilization laboratory of the Theriogenology section is a state-of-the-art designed for conducting advanced studies on gamete and embryo biotechnology of domestic and wild animal species. In horses, intracytoplasmic sperm injection is currently the only successful procedure used to produce horse embryos in vitro. Several graduate students and residents have been trained in advanced assisted reproduction techniques that are currently used in research studies and reproductive management of horses.



Equine Molecular Biology Research Laboratory

The Equine Molecular Biology Research Laboratory is equipped to support the molecular biology aspects of research conducted by the EHSP investigators. The missions of this laboratory are to perform research to explain the molecular basis of disease with a view to improved clinical approaches; to train scientists, students, and visitors at all levels; and to develop new instruments and methods in equine molecular biology. We also have direct access to the core facilities within the LSU SVM Division of Biotechnology and Molecular Medicine (BIOMMED) for quantitative Real-Time PCR, primer/probe design, Quantity One for DNA fragment visualization and analysis, SDS-PAGE analysis, MagnaPure automated nucleic acid extraction, and microarray spotters and readers. Current investigations utilizing this laboratory include study of key mediators in equine laminitis, metabolic disease, gastrointestinal disease, summer pasture-associated recurrent obstructive airway disease, bone healing and mechanisms of pain sensation and modulation. The capabilities of this laboratory have expanded in light of the increasing importance of the molecular biological approach to the investigation of equine health and disease.



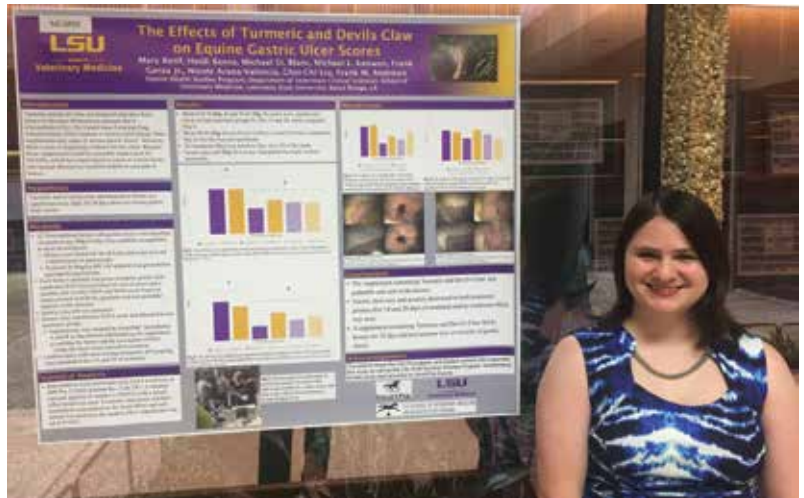
Effects of supplements containing Turmeric and Devil's Claw on equine gastric ulcer scores and gastric juice pH

Authors/Investigators

M. St. Blanc, H. Banse, M. Retif, N. Arana-Valencia, M.L. Keowen, F. Garza, Jr., C. Liu, L.F. Gray, and F.M. Andrews

Introduction

Commercial supplements containing turmeric (*Curcuma longa*) and devil's claw (*Harpagophytum* species) have been used to ameliorate pain and inflammation attributed to osteoarthritis (OA) and other disease processes in horses. In practice, these supplements are often used as a substitute for non-steroidal anti-inflammatory agents (NSAIDs) which may be prescribed for treatment of these conditions. The anti-inflammatory properties of turmeric extract and *Harpagophytum* spp. have been described and include inhibition of both cyclooxygenase-2 (COX-2) and prostaglandin-E2 (PGE2) production. Because turmeric is a spice and devil's claw contains plant irritants, there is anecdotal concern that their use might result in adverse effects including gastric ulceration, hypoproteinemia, azotemia, and loss of body condition as may be seen with prolonged use of NSAIDs, which inhibit both COX-1 and COX-2 enzymes. The National Animal Supplement Council currently requires that supplements containing turmeric include the label cautions "may be GI irritant" and "not to be used in patients with stomach ulcers," while supplements with devil's claw include the label caution "use with caution in animals at risk for GI ulcerations." However, there is a lack of supporting evidence for the validity of these claims in horses. In contrast, studies in humans and other species provide evidence that turmeric has gastroprotective properties and may be considered a therapeutic modality for treatment of gastric ulcers in people. In light of these contradictions, data demonstrating the safety of supplements containing turmeric and devil's claw in horses would be of great clinical value to equine veterinarians who may prescribe them for use in patients with inflammatory conditions.



Objective

The purpose of this study was to determine if feeding a supplement containing turmeric and devil's claw would worsen gastric ulcer scores, change gastric juice pH, decrease body weight or alter blood parameters in horses.

Methods

Twelve Thoroughbred horses with gastric ulcers were identified via gastroscopy (Day 0) to establish susceptibility to ulcer development. For each exam, an equine gastric ulcer syndrome (EGUS) score based on size of ulcers and a number and severity (NGN and NGS) score based on ulcers present in the non-glandular region of the stomach were assigned by a blinded investigator, and gastric juice pH was measured. Horses were stratified by





GASTROINTESTINAL HEALTH

EGUS score and allocated to two treatment groups. Horses in the treatment group were administered the supplement for twenty eight days, while control horses received the inactive ingredients of the supplement only. Gastroscopy with ulcer scoring and gastric pH sampling was repeated on day 14 and 28.

Results

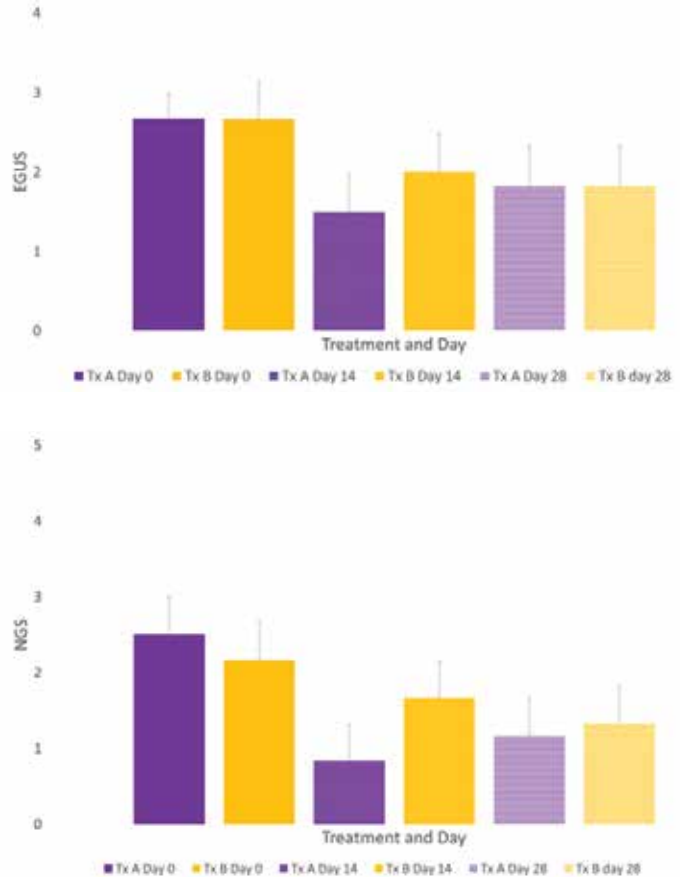
Mean EGUS and NGS scores were significantly lower in both treatment groups by Day 14 and 28 when compared Day 0. Mean NGN score was lower on Days 14 and 28 when compared to Day 0, but this was not significant. No treatment effect was noted on Day 14 or 28 of the study. Gastric juice pH was low throughout the study in both groups.

Take Home Message

The supplement was palatable and well-tolerated, and administration did not lead to worsening of gastric ulcers after 28 days of treatment.

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Impact of concurrent treatment with omeprazole on phenylbutazone-induced equine gastric ulcer syndrome (EGUS)

Authors/Investigators

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Background

Phenylbutazone is commonly prescribed for treatment of a variety of painful or inflammatory disorders in horses, but is associated with gastrointestinal adverse effects. Anecdotally, many practitioners prescribe omeprazole concurrently with phenylbutazone to reduce development of equine gastric ulcer syndrome (EGUS), but the efficacy and safety of this practice remains unknown.

Objectives

To evaluate the effect of omeprazole on phenylbutazone-induced glandular and squamous ulcers

Study Design

Randomized block experimental design.

Methods

Twenty-two horses with glandular and squamous ulcer scores ≤ 2 were included. Horses were assigned to treatment groups: phenylbutazone (4.4 mg/kg PO q 12 h), phenylbutazone plus omeprazole (4 mg/kg PO q. 24 h) or placebo in a randomized block design based upon initial glandular ulcer score. Horses were treated for up to 14 days. Gastroscopy was performed weekly; CBC and biochemistry were performed at Day 0 and study end. Horses were monitored for signs of colic and/or diarrhea.

Results

Glandular ulcer score increased in phenylbutazone compared to phenylbutazone plus omeprazole ($P = .05$). Phenylbutazone plus omeprazole (6/8) had more intestinal complications than placebo-treated horses (0/6; $P = .03$). Plasma protein concentrations decreased in phenylbutazone, compared to placebo-treated horses ($P = .03$). Five horses were withdrawn from the study due to intestinal complications ($n = 3$ phenylbutazone plus omeprazole and $n = 2$ phenylbutazone); one horse (phenylbutazone) was withdrawn due to severe grade 4 glandular ulcers.





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Main limitations

Small sample size and changes in management for the 2-3 days prior to study initiation; variable treatment duration among groups due to development of complications.

Conclusions

Administration of omeprazole ameliorated phenylbutazone-induced glandular ulcers, but was associated with an increase in intestinal complications. Caution should be exercised when co-prescribing phenylbutazone or non-steroidal anti-inflammatory drugs and omeprazole in horses, particularly in association with change in management.

Funding

Funding for this project was provided by the Charles V. Cusimano Equine Health Studies Program.

Year Completed

2019-2020

Comparison of the gastric microbiome in horses with and without glandular ulcers

Authors/Investigators

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Background

The pathophysiology of equine glandular ulcers remains poorly understood. The role of the gastric microbiome in development or persistence of glandular ulcers remains to be investigated.

Hypothesis/Objectives

The objective of this study was to characterize the glandular mucosal and gastric fluid microbiome of horses with and without glandular ulcers. It was hypothesized that differences in the microbiome of glandular gastric mucosa would be associated with the presence of glandular ulcers.

Animals

Twenty-four light breed horses under the same management protocol were enrolled in this study. Gastroscopy for each horse was performed within a one-week time period and glandular ulcer scores recorded (score 0, n=6; score 1, n=8; score ≥ 2 , n=10). Gastric fluid and pinch biopsies of endoscopically healthy glandular mucosa and of endoscopically visible glandular ulcers of the glandular mucosa were collected. 16S rRNA amplicon sequencing of the gastric fluid and glandular mucosal biopsies was performed.

Relationships between gastric fluid and mucosal microbial community composition were evaluated between glandular ulcer score groups (0, 1, ≥ 2) and between biopsy types: controls and normal areas, hyperemic areas, and lesions from horses with glandular ulcers ≥ 1 .

Results

Principal coordinate analysis showed distinctly tighter clustering for grade 0 biopsies compared to grade 1 or grade 2 biopsies. This pattern was confirmed when the biopsies were grouped by type. The richness of the microbial populations of biopsies glandular ulcers ≥ 2 was significantly higher compared to grade 0 (Chao 1 index; $p=0.04$). Differences between grade 0 and grade ≥ 2 were also identified using the Jaccard similarity index ($p=0.006$). Principal coordinate analysis demonstrated that gastric fluid microbial communities in horses with glandular ulcers ≥ 2 overlapped with biopsies from ulcers grade ≥ 2 , but in horses with score 0, gastric fluid and glandular biopsies had separate clusters. This was confirmed using the Jaccard similarity index (glandular ulcer score ≥ 2 , $p=0.23$; score 0, $p=0.01$).



Conclusions

These findings indicate that glandular ulcers are associated with changes in the glandular mucosal microbiome. These findings also suggest that there is an increase in microbial colonization in glandular ulcers that parallels gastric fluid composition.

Funding

Funding for this project was provided by the Charles V. Cusimano Equine Health Studies Program.

Year Completed

2019-2020



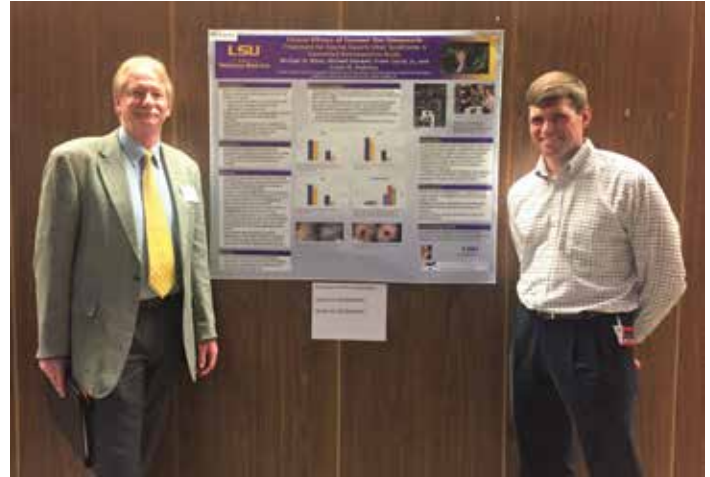
Clinical Efficacy of Fourteen Day Omeprazole Treatment for Equine Gastric Ulcer Syndrome: A Controlled Retrospective Study

Authors/Investigators

M. St. Blanc, M. Keowen, F. Garza, Jr., and F.M. Andrews

Introduction

Equine gastric ulcer syndrome (EGUS) is common in horses and lesions occur in the squamous mucosa (equine squamous gastric disease [ESGD]) and in the glandular mucosa (equine glandular gastric disease [EGGD]). Omeprazole, a proton pump inhibitor (PPI), is the mainstay of treatment for EGUS. The label dose of omeprazole (4 mg/kg PO q24 hours) administered for up to 28 days has demonstrated efficacy in horses with ESGD. In horses with EGGD, longer durations of treatment (28-35 days) resulted in healing, which may be improved with adjunct therapies.



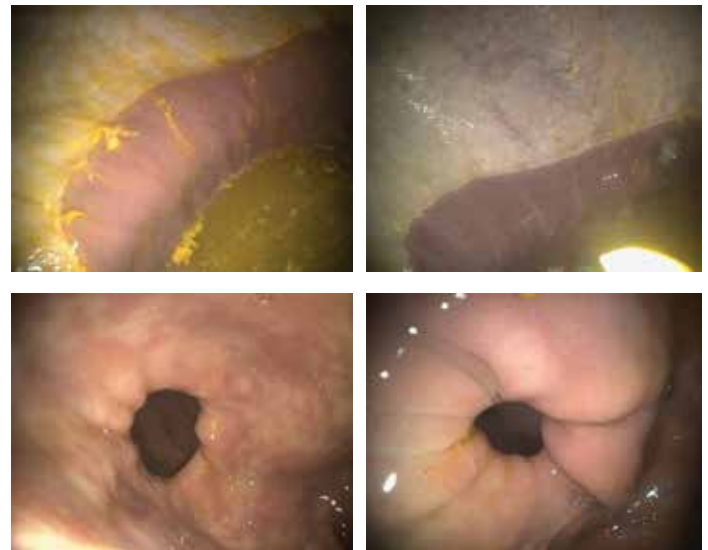
Treatment of EGUS for 28 days is costly and might be financially prohibitive for some clients; therefore, treatment is often shortened by practitioners without objective data. Information on the efficacy of a shorter duration of omeprazole treatment for EGUS would be of great clinical value. To the authors' knowledge, the endoscopic appearance of the stomach of stall-confined horses has not been evaluated after 14 days of omeprazole treatment.

Objective

The purpose of this study was to evaluate the efficacy of a fourteen day course of omeprazole treatment (4 mg/kg PO q 24 hours) in horses with documented ESGD and/or EGGD.

Methods

The records and endoscopic findings of horses enrolled in seven clinical gastric ulcer studies conducted at the LSU School of Veterinary Medicine between 2010 and 2015 were reviewed. Ninety-six (96) horses diagnosed with ESGD and/or EGGD were treated with omeprazole for 14 days and met the inclusion criteria, while forty-six (46) horses served as controls. Gastroscopy was performed on days 0, 14, and 28. Equine Gastric Ulcer Syndrome scores (EGUS), non-glandular and glandular number (NGN, GN) and non-glandular and glandular severity (NGS, GS) ulcer scores were recorded by the same masked investigator.



Results

ESGD (EGUS, NGN, and NGS) scores decreased significantly ($P= 0.03, 0.05, 0.04$, respectively) in the treated group after 14 days of omeprazole treatment when compared to the control group. EGGD scores did not change over the same period, but the frequency of complete healing of ESGD and EGGD was significantly higher in the treatment group (Chi square likelihood ratio 0.003, 0.024) compared to untreated controls. ESGD and EGGD ulcer scores significantly increased in the OME-treated group on day 28, 14 days after treatment was discontinued.

Take Home Message

Fourteen days of omeprazole (4 mg/kg PO q 24 hours) may be an efficacious treatment for ESGD and/or EGGD. However, repeat endoscopic evaluation is recommended after discontinuing treatment as recurrence is common, and further therapy may be warranted in cases with persistent lesions.

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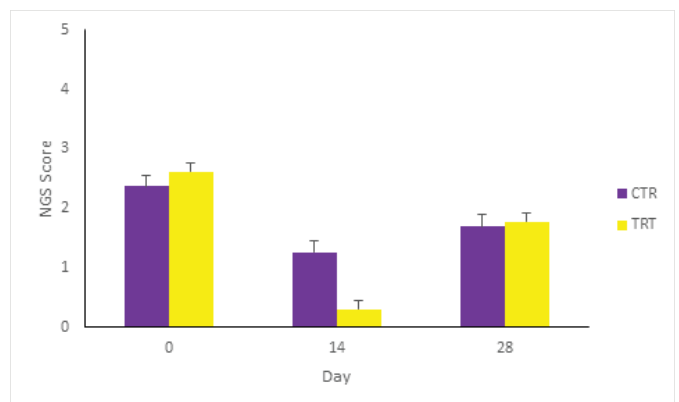
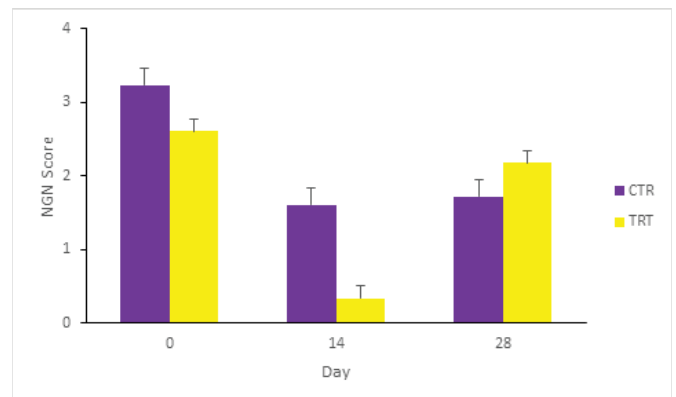
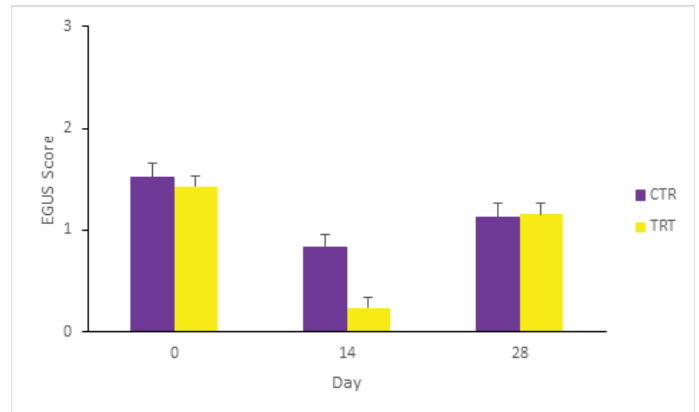
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Blueberry Feeding Improves Hematological Parameters in Exercising Horses

Authors/Investigators

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Introduction

Blueberries (BB) have been studied for their effects on boosting memory, attenuating cancer risks, improving heart health, and improving motor function in humans¹.

These effects in humans have led to the marketing of BB as having similar effects in pet foods and nutraceuticals. Due to the lack of scientific evidence to support these claims, this study's aim was to provide empirical evidence regarding the effects of BB fed to horses on exercise parameters.

Hypothesis

The study's objective was to investigate the effects of BB feeding on cardiovascular system and blood parameters in sedentary and exercising Thoroughbred (TB) horses.

We hypothesize that BB will have beneficial effects on the hematologic and cardiovascular (CV) systems during exercise.

Materials and Methods

Horses

23 TB horses were used (3-16 years [mean 9.2 years, 505 ± 59 kg/BW]). All horses were unfit at the beginning of the study.

Treatment Groups

A commercial diet (Strategy, Purina Land-o-Lakes, Gray Summit, MO) or the same diet with added freeze-dried BB (4%) was fed to 5 groups of horses. Diets were milled on the same date and arrived at LSU on the same day.



Experimental groups are listed in the Table 1.

Group	Treatment
I - BB-SED	Sedentary + BB Feed (10d)
IA - CT-SED	Sedentary + Control feed (10d)
II - BB-SED/EX	Sedentary BB feed (10d) + Exercise BB feed (10d)
III - BB-EX	Exercise Control feed (10d) + Exercise BB feed (10d)
IV - CT-EX	Exercise Control feed (10d) + Exercise Control feed (10d)

Day 0: Physical exam, resting electrocardiogram (ECG), intravenous catheters placed in left jugular vein, baseline blood sample, echocardiogram exam (Echo) was performed.

Days 1-9, 11-19: Treadmill training consisting of 5 min at a walk (1.7m/s), 5 min at a trot (3.0m/s), 2 min at gallop (5.6m/s), 2 min trot, and 3 min walk on an incline.

Day 0, 10 and 20 (Fig 2)

Standard Exercise Testing (SET)

SET consisted of 3 min at 1.7m/s, 3 min at 3m/s, 90s at 6m/s, and 60s intervals at 8m/s and 10m/s. Physiologic and metabolic responses to the SET were evaluated.

Heart rate: continuous

Venous blood samples were collected in tubes containing EDTA: at time 0, then 15 secs before the treadmill velocity was increased and 2, 5, and 10 min following the SET. (Fig 2)

Packed Cell Volume (PCV) and Total Solids (TS)

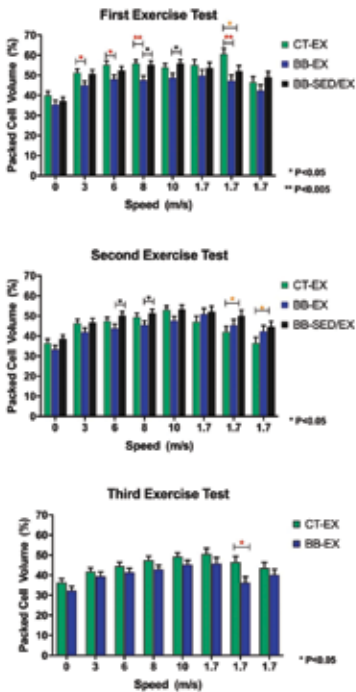
The PCV was determined by micro-hematocrit method and the TS was determined using a refractometer (Fig 1).



Fig 1: Centrifuge, micro-hematocrit tubes, hematocrit reader, and refractometer used to determine PCV and TS measurements.



Fig 2: Blood sampling during SET on the treadmill using a jugular catheter.



Statistical Analysis

All available data was analyzed via Mixed ANOVA with fixed effects, their interactions (day, treatment, and treadmill speed), and each horse as the random effect. A post-hoc Tukey’s test was performed when data was significant in the overall model. Significant difference was considered at P<0.05.

Fig 3: Mean PCV and SEM values in horses during three exercise tests. Significant differences are indicated by the asterisk where * denotes differences between BB-EX and BB-SED/EX, * denotes differences between CT-EX and BB-SED/EX and * denotes for differences between CT-EX and BB-EX.

Fig 4. Mean TS and SEM values in horses during three exercise tests. Significant differences are indicated by the asterisk. * asterisk denotes differences between BB-EX and BB-SED/EX, * asterisk for differences between CT-EX and BB-SED/EX and * asterisk for differences between CT-EX and BB-EX.

Results

- All horses consumed the feed containing blueberries and maintained body condition scores.
- PCV and TS were not significantly different in sedentary horses fed BB compared to control horses.
- PCV and TS increased significantly with exercise.
- After the second SET, peak PCV [SEM] in both groups of horses fed the control diet was not significantly different (Fig 3 & 4).
- During the third SET, peak mean PCV [SEM] was significantly lower in horses switched to BB feed, compared to horses fed the control feed while recovering from the SET (Fig 3).

Discussion and Conclusions

- The 4% blueberry diet was readily consumed by the horses with no adverse effects.
- Peak PCV and TS values were lower in blueberry-fed horses prior to training.
- Blueberry-fed horses had lower PCV during exercise and PCV recovered faster when compared to controls.
- Blueberries might decrease blood viscosity, improve cardiac output, and decrease peripheral vascular resistance in horses performing moderate exercise, which might lead to improved athletic performance and more rapid recovery.

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Acknowledgements

The authors would like to thank the US Highbush Blueberry Council for providing the blueberries and partial funding. Also, we want to thank Purina Mills, for providing the control and BB feeds used in this study and technical support provided by Dr. Victor Medina, Dr. Britta Leise, Catherine Koch, Mariah Markle, Jenny Windham, Ethan Olah, Allison Briscoe, Camille Hamel, and Julliett Monbrun.



The effects of blueberry consumption on reactive oxygen species in sedentary and exercising horses

Authors/Investigators

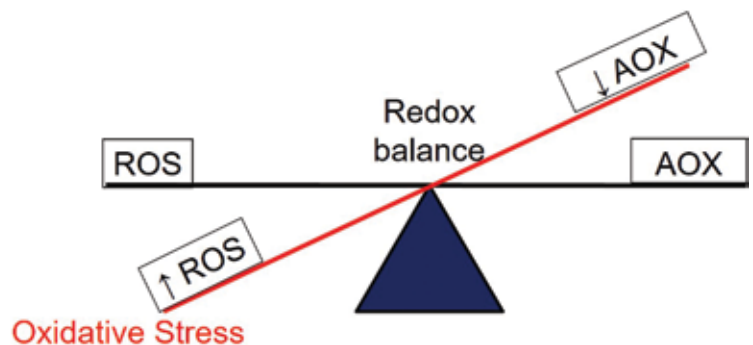
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Introduction

Reactive oxygen species (ROS) are a class of oxygen derived free radicals which lack one or more electrons in the outer shell. These molecules are highly reactive and interact with neighboring compounds. Examples of ROS include superoxide anion (O₂⁻), hydroxyl radical (HO·), hydrogen peroxide (H₂O₂), and singlet oxygen (1O₂).

Reactive oxygen species may produce harmful effects in biologic systems which is termed “oxidative stress” (e.g. damage DNA, lipid peroxidation, protein peroxidation, and enzyme deactivation). There is mounting evidence that ROS also serve an important role as signaling pathways (e.g. cellular injury, inflammation, ischemia, metabolic regulatory pathways, etc.). ROS are produced in both aerobic and anaerobic exercise in response to repetitive muscle contraction. Blueberries are rich in natural antioxidants (AOX) especially anthocyanins which have been shown experimentally to counter the effects of oxidative stress by decrease ROS production in vitro and in vivo.



Hypothesis

The study's objective was to investigate the effects of BB feeding on redox balance in sedentary and exercising Thoroughbred (TB) horses. We hypothesize that exercise training alone will result in increased ROS production and BB will have beneficial effects on redox balance in regards to exercise adaptation and endurance.

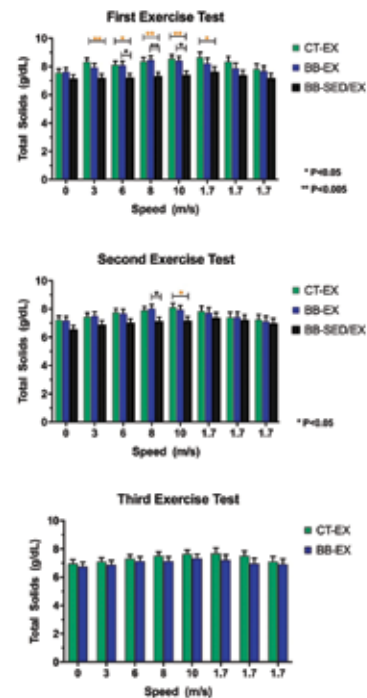
Methods

Horses

23 TB horses 9 ± 4 years (range 3-16 years) and 505 ± 59 kg were studied. All horses were unfit at the study's onset. Both geldings (n=14) and mares (n=9) were included.

Treatment Groups

Horses were fed either a commercial equine pellet (CT) [Strategy, Purina Land-o-Lakes, Gray Summit, MO] or the same diet milled with 4% freeze dried blueberries (BB). Diets were milled on the same date for consistency. Treatment groups are described in Table 1. Horses were confined to stalls during the study and fed pellet (0.6% body weight) divided into 2 feeding and free choice grass hay.



Group	N	Treatment
BB-SED	6	Sedentary + BB diet (10d)
CT-SED	6	Sedentary + Control diet (10d)
BB-SED/EX	6	Sedentary BB diet (10d) + Exercise BB diet (10d)
BB-EX	5	Exercise Control diet (10d) + Exercise BB diet (10d)
CT-EX	6	Exercise Control diet (10d) + Exercise Control diet (10d)

Table 1: Treatment groups and sample number

Standard Exercise Testing (SET)

Standard Exercise Test (SET) was performed on Day 0, 10, 20. Exercise test consisted of 3 min at 1.7 m/s, 3 min at 3 m/s, 1.5 min at 6 m/s, and 1 min at 8 m/s and 1 min at 10m/s. Recovery period consisted of 10 min at 1.7 m/s.

Baseline procedures

Physical exam, ECG telemetry, left jugular catheterization, echocardiogram, and baseline blood sampling

Data collected during exercise

Heart rate was measured continuously with telemetry. Blood samples were collected in heparin lithium tubes at T0 and during the final 15s of the speed interval. Sampling continued in the recovery period at 2 min, 5 min, and 10 min.

Conditioning Protocol

Days 1-9, 11-19: Treadmill conditioning was performed for 8 days during the period between SETs. Exercise protocol consisted of 5 min at 1.7 m/s, 5 min at 3 m/s, 2 min at 5.6 m/s, 2 min at 3 m/s, and 3 min at 1.7 m/s on an incline.

Redox balance measurement

Redox balance was assessed by measuring total reactive oxygen species in each blood sample using a spin trap agent and electron paramagnetic resonance spectroscopy. Units were recorded as ROS production/min.



Fig 1: Data collection during standard exercise test.

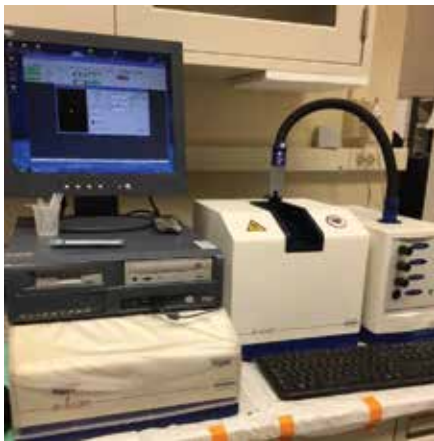


Fig 2: Electron paramagnetic resonance spectroscopy (EPR).

Statistical Analysis

Data were analyzed using a Mixed ANOVA with fixed effects, their interactions (day, treatment, and treadmill speed), and each horse as the random effect. A post-hoc Tukey's test was performed when data was significant in the overall model. Significant difference was considered at $P < 0.05$.

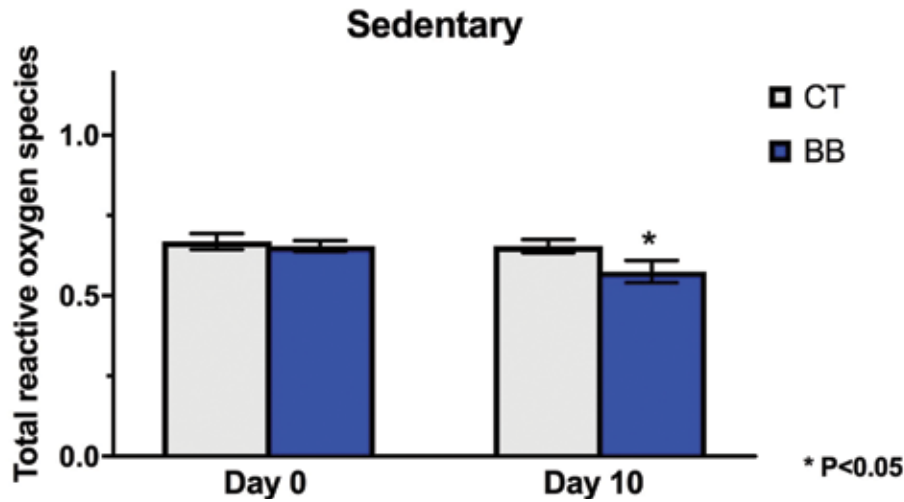


Fig. 3. Mean plasma total ROS (production/min) in sedentary horses feed control diet and BB diet. Significance of $p < 0.05$ compared to Day 0 is denoted by asterisk (*).

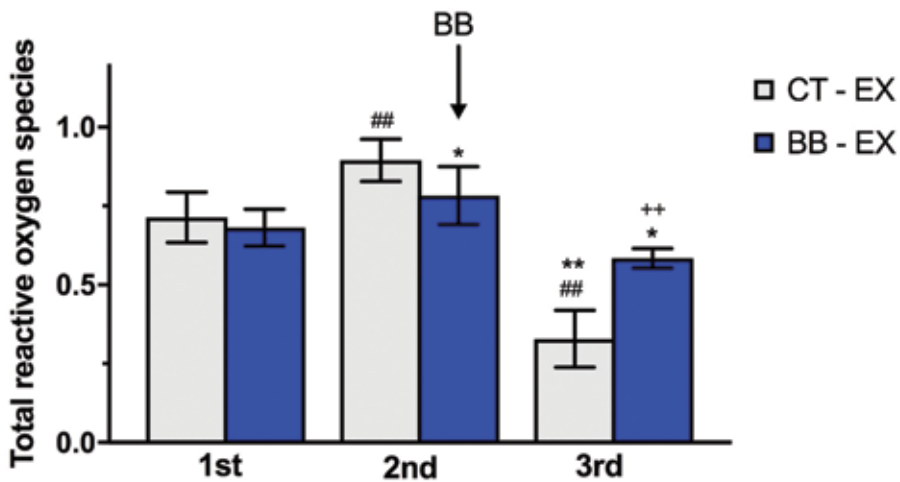


Fig. 4. Mean plasma total ROS (production/min) in exercising horses pre-fed BB diet compared to CT diet. Significance of $p < 0.005$ compared to CT on Day 0 is denoted by asterisk (**). Significance of $p < 0.005$ compared to CT second test is denoted by ##.

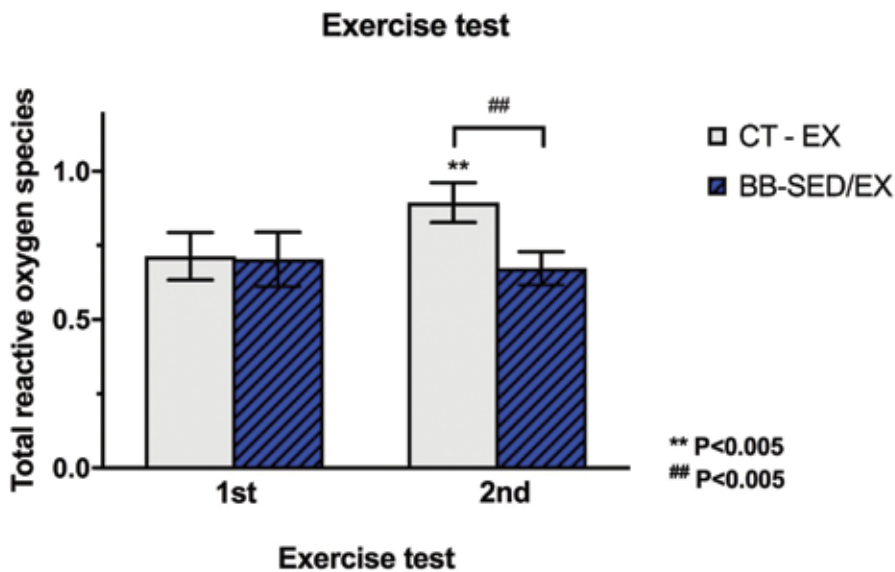
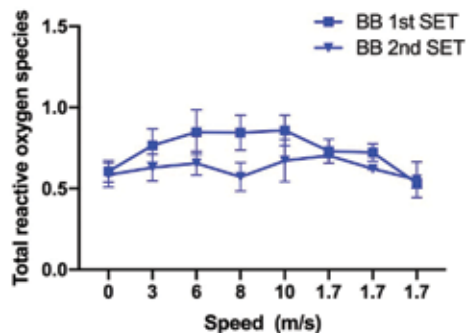


Fig. 5. Mean plasma total ROS (production/min) in exercising horses undergoing 10 days of exercise training prior to onset of BB diet compared to CT diet. (##) denotes $p < 0.005$ compared to Day 0 CT. (*) denotes $p < 0.05$ compared to Day 0 BB. (**) denotes $p < 0.005$ compared to Day 0 BB. (++) denotes $p < 0.005$ compared to Day 20 CT.

Results

Commercial diet supplemented with blueberries was readily consumed by TB horses with no adverse effects noted. Horses remained sound throughout the study, and all showed improved fitness in response to treadmill training. Mean plasma ROS activity was significantly lower by Day 10 in sedentary horses fed blueberry diet (Fig 3).



In exercising horses, mean plasma ROS significantly increased during the second SET compared to baseline SET in horses receiving CT. Mean plasma total ROS activity was significantly lower during the second SET in horses that were pre-fed blueberry diet compared to CT diet. (Fig 4). Mean ROS activity increased significantly from 0.6809 ± 0.04 in blueberry fed and 0.7137 ± 0.03 in control horses on Day 0 to 0.7828 ± 0.04 and 0.8946 ± 0.03 , respectively, during exercise on Day 10 (Fig 5). Mean ROS significantly decreased during the third SET in blueberry-fed (0.5835 ± 0.04) and control (0.3289 ± 0.03) horses after 20 days of exercise (Fig 5).

Fig. 6. Mean plasma total ROS (production/min) over time in exercising horses fed control diet and BB diet. Significance of $p < 0.05$ compared to 1st SET is denoted by asterisk (*).

Mean plasma ROS activity was not significantly increased with speed in either blueberry fed or control fed horses (Fig 6). However, plasma ROS activity was significantly increased at 3 m/s, 6 m/s and 10 m/s during the second SET in horses receiving control diet. (Figure 6).

Discussion and Conclusions

- Moderate intensity treadmill exercise in horses results in oxidative stress through the generation of reactive oxygen species.
- Blueberry feeding prior to the onset of the training program decreased ROS generation and resulted in stronger antioxidant effects.
- Reactive oxygen species generated physical exercise can also upregulate antioxidant enzyme systems to counter oxidative stress (“hormetic adaptation”). This was noted in horses undergoing moderate regular treadmill exercise which demonstrated reduced reactive oxygen species on Day 20 of exercise.
- Blueberries may attenuate exercise-induced oxidative stress and maintain redox balance, especially when supplemented prior to the onset of exercise training.
- Blueberry feeding lowers reactive oxygen species in sedentary horses, thus, may provide a beneficial antioxidant effect even in horses that are not exercising.

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Acknowledgements

Funding was provided by the US Highbush Blueberry Council. The authors would like to thank Purina Mills for formulating the diets used in this study. In addition, we would like to thank Dr. Victor Medina, Dr. Britta Leise, Catherine Koch, Mariah Markle, Jenny Windham, Ethan Olah, Allison Briscoe, Camille Hamel and Juliette Monbrun.



Blueberry feeding improves volume of work in exercising horses by lowering heart rate and lactate

Authors/Investigators

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Introduction

Blueberries (BB) have been studied for their effects on boosting memory, attenuating cancer risks, improving heart health, and improving motor function in humans¹.

These effects in humans have led to the marketing of BB as having similar effects in pet foods and nutraceuticals. Due to the lack of scientific evidence to support these claims, this study's aim was to provide empirical evidence regarding the effects of BB fed to horses.

Hypothesis

The study's objective was to investigate the effects of BB feeding on heart rate and lactate concentration in sedentary and exercising Thoroughbred (TB) horses. We hypothesize that BB-feeding will result in a lower heart rate and blood lactate concentration during and after exercise.

Materials and Methods

Horses

23 TB horses, age range: 3-16 years (mean = 9 years) with Body Weight: 505 ± 59 Kg). All horses were unfit at the study's onset.

Treatment Groups

A commercial diet (Strategy, Purina Land-o-Lakes, Gray Summit, MO) or the same diet with added freeze-dried BB (4%) was fed to 5 groups of horses (Table 1). Diets were milled on the same date and shipped to LSU on the same day.

Group	Treatment
I-SED/BB	Sedentary + BB diet (10d)
IA-SED/CT	Sedentary + Placebo diet (10d)
III-BB/EX	Exercise Placebo feed (10d) + Exercise BB diet (10d)
IV-CT/EX	Exercise Placebo feed (10d) + Exercise Placebo diet (10d)

Table 1. Experimental groups.

Testing/Training Protocol

Day 0: Physical exam, resting electrocardiogram (ECG), intravenous catheters placed in left jugular vein, baseline blood sample, echocardiogram exam (Echo) was performed.

Days 1-9, 11-19: Treadmill training consisting of 5 min at a walk (1.7m/s), 5 min at a trot (3.0m/s), 2 min at gallop (5.6m/s), 2 min trot, and 3 min walk on an incline.

Day 0, 10 and 20: Standard Exercise Test (SET).

Standard Exercise Testing (SET)

SET consisted of 3 min at 1.7 m/s, 3 min at 3m/s, 90s at 6 m/s, and 60s intervals at 8 m/s and 10 m/s. Physiologic and metabolic responses to the SET were evaluated.

Heart rate: continuous using telemetry system (Televet® 100, Engel Engineering, GmbH, Germany) (Fig 1 & 2). Venous Blood samples were collected: at time 0 then 15 secs before the treadmill velocity was changed and 2, 5, and 10 min following the exercise test. Blood lactate (Lactate Plus™, Nova Biomedical, Waltham, MA, USA) was determined immediately after sampling (Fig 4).

Statistical Analysis

All available data was analyzed via Mixed ANOVA with fixed effects, their interactions (day, treatment, and treadmill speed), and each horse as the random effect. A post-hoc Tukey's test was performed when data was significant in the overall model. Significant difference was considered at $P < 0.05$.



Fig 1. Exercise testing, note jugular vein catheter (arrow) for blood sampling and telemetry ECG unit (arrowhead).

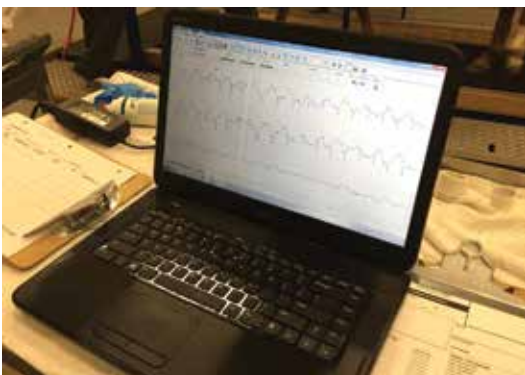


Fig 2. Recording HR during SET with Televet® 100



GASTROINTESTINAL HEALTH

Results

All horses consumed the feed and maintained body condition scores. Heart rate and lactate significantly increased with exercise. Peak mean heart rate was significantly lower in the BB-Sed/EX horses compared to the CT-EX horses during the second SET.

Peak heart rate was lower in the BB-EX horses compared to CT-EX horses during the third exercise test. Significant difference was considered at $P < 0.05$ (Fig 3). Peak mean lactate was significantly lower in the BB-Sed/EX and the BB-EX horses compared to the CT-EX horses during the second SET. Significant difference was considered at $P < 0.05$ (Fig 3).

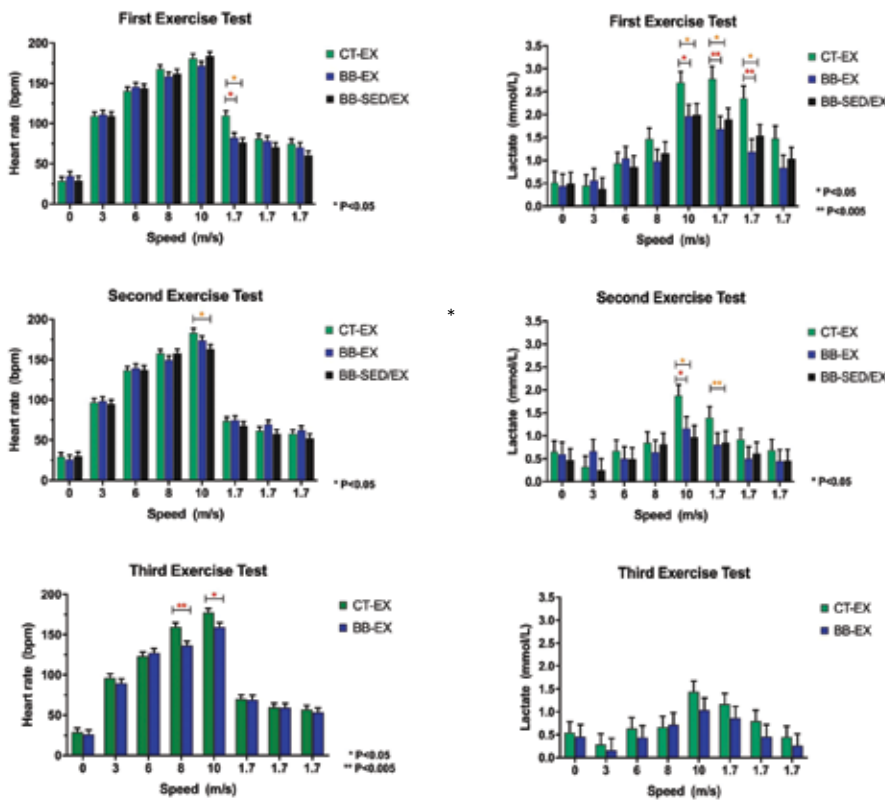


Fig 3. Mean Heart Rate and Lactate values. denotes significant difference between CT-EX and BB-EX and * denotes significant difference between CT-EX and BB-SED/EX.

Discussion

BB mixed in commercial diet (4%) were readily eaten by the horses and no adverse effects. Horses were at various stages of fitness at the beginning of the study. The exercise test resulted in increased HR and Lactate values in the horses. Although, blood lactate concentration did not exceed anaerobic threshold (4 mmol/L) and horses were not exercised to fatigue. 2-4 HR and lactate increased significantly ($p < 0.05$) in exercising horses, compared to the sedentary horses. Peak HR and Lactate were lower in the fit BB-fed horses when compared to control horses.

Conclusions

4% BB mixed in a commercial feed and fed to horses resulted in lower heart rate and lower whole blood lactate values during peak exercise in horses.



Blueberries fed to horses improved cardiovascular and anaerobic parameters in exercising horses, which might improve muscle function and recovery.



Fig 4. Lactate plus meter used in the study.



Fig 5. Horse running on the treadmill with Telemetric ECG system.

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Acknowledgements

The authors would like to thank the US Highbush Blueberry Council for providing the blueberries and partial funding. Also, we want to thank Purina Mills, for providing the control and BB feeds used in this study and technical support provided by Dr. Victor Medina, Catherine Koch, Mariah Markle, Jenny Windham, Ethan Olah, Camille Hamel, and Julliett Monbrun.



Development of an Ultrasound-Guided Injection Technique of the Cervical Nerve Root for the Treatment of Neck Pain in Horses: A Cadaveric Study

Authors/Investigators

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Introduction

- Neck pain in horses can result in lameness and reluctance to perform.
- In people, cervical nerve root impingement (radiculopathy) from periarticular bone proliferation can result in pain, which can be treated by perineural injections

Objective

The objective of this study was to develop an ultrasound-guided cervical perineural injection technique in horses and to compare the distribution of injectate between intra-articular, periarticular and perineural injections.

Methods

- 14 necks were collected from horses euthanized for reasons unrelated to the study.
- Anatomical landmarks surrounding the caudal cervical nerves (C4-C7) were determined via dissection and dissected necks were used to perform water bath ultrasound (Figure 1a) allowing for development of the ultrasound-guided perineural injection technique (Figure 1b).
- To evaluate the success of the developed cervical perineural injection technique it was compared to the currently used intra-articular injection technique and a periarticular injection (to mimic a missed intra-articular injection).
- Iodinated or paramagnetic contrast was injected into predetermined locations and evaluated by computed tomography (CT) or magnetic resonance imaging (MRI) (Figure 1c, 1d).
- The probability of contrast reaching the cervical nerve root was determined for each injection technique.

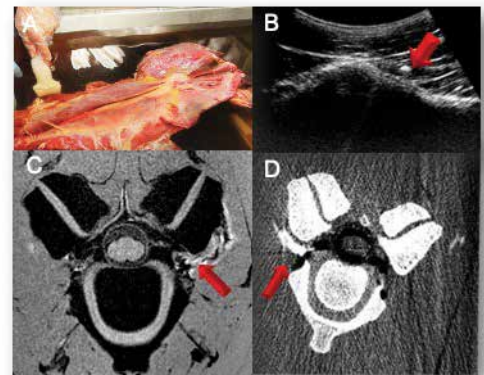


Figure 1: (A) Water bath ultrasound to identify landmarks (B) Ultrasound-guided perineural injection technique, arrow demonstrates injection at cervical nerve root (C) Transverse T2 water excitation MRI with contrast distribution (arrow) around the intervertebral foramen and cervical nerve root (D) Transverse CT image with contrast distribution (arrow) around the intervertebral foramen and cervical nerve root

Results

Perineural injections were significantly more likely to deliver contrast (100%) to the cervical nerve root when compared to the intra-articular (0%, $p=0.008$). There was no difference between the periarticular and perineural or the intra-articular and periarticular group in their ability to have contrast reach the cervical nerve root.

Conclusions / Take Home Message

Despite the small sample size the ultrasound-guided cervical perineural injection technique has the potential of being useful for the treatment of neck pain in the horse, particularly when intra-articular process joint injection are not beneficial.

Funding

Funding for this project was provided by the Charles V. Cusimano Equine Health Studies Grant

Year Completed

2019

Comparison evaluation of three methods of insulin resistance testing in horses

Authors/Investigators

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Introduction

- Insulin resistance (IR) is common in horses with Equine Metabolic Syndrome (EMS)
- IR is thought to be a risk factor for developing laminitis
- Several diagnostic tests are used to diagnose IR in horses, however comparison of these tests for diagnosis of IR is lacking.

Objectives and Hypothesis

- Compare the IR testing using the oral sugar test (OST), insulin response test (IRT), and frequently sampled insulin glucose test (FSIGT) in horses with suspected IR.
- Hypothesis: Direct measurement of glucose using the IRT method will be superior to the other tests in the diagnosis of IR in horses.



Methods

- Six Quarter Horse mares suspected of having IR were tested for insulin resistance using three commonly used diagnostic methods.
- For all procedures, mares were fasted overnight in stalls with ad libitum access to water.
- Insulin Response Test (IRT)



- Test was conducted in the Summers of 2018 and 2019
- Jugular blood sample was collected at -10, 0, 40, and 60 minutes relative to time of insulin administration (IV; Novolin® 50 mU/kg body weight (BW))
- Glucose was measured using a handheld glucometer (Alphatrack2®)
- Oral Sugar Test (OST)
- Test was conducted on May 2018
- Jugular blood sample (10mL) was collected at 0, 30, 60, and 90 minutes relative to time of oral glucose administration (10% Light Karo Syrup; 0.15 mL/kg BW)
- Blood glucose was measured tableside using a handheld glucometer (Alphatrack2®), in addition, samples were sent to Michigan State University for insulin and glucose analysis
- Frequently Sampled Insulin and Glucose Test (FSIGT)
- Test was conducted in June of 2019
- IV catheter was placed on both jugular veins. Left side was used for blood draws while the right side was used for insulin and dextrose administration
- Blood was collected using a 12 mL syringe at 0, 1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 16, 18, 20, 22, 23, 24, 25, 27, 30, 40, 50, 60, 70, 80, 90, 120, 150, and 180 minutes relative to dextrose administration (50% dextrose solution; 300 mg/kg BW)
- Insulin (Novolin®; 0.015 U/kg BW) was administered at minute 20.
- Blood glucose was measured tableside using a handheld glucometer (Alphatrack2®), in addition, samples were sent to Michigan State University for insulin and glucose analysis.

Results

Insulin Response Test

11-Jul-19

	Time	Time	Time	Time		% Drop	% Drop	
Horse	-10	0	40	60	Ave pre Insulin	40 min	60 min	Largest Drop
515	109	102	87	93	105.5	17.54	11.85	17.54
555	108	107	92	80	107.3	14.42	25.58	25.58
562	99	108	103	103	103.5	0.48	0.48	0.48
583	108	111	77	93	109.5	29.68	15.07	29.68
607	100	102	88	86	101	12.87	14.85	14.85
614	93	101	84	93	97	13.40	4.12	13.40

18-May-18

	Time	Time	Time	Time		% Drop	% Drop	
Horse	-10	0	40	60	Ave pre Insulin	40 min	60 min	Largest Drop
515	84	84	67	78	84	20.24	7.14	20.24
555	75	78	72	78	76.5	5.88	-1.96	5.88
562	102	99	80	92	100.5	20.40	8.46	20.40
583	100	95	80	94	97.5	17.95	3.59	17.95
607	83	83	61	79	83	26.51	4.82	26.51
614	87	89	57	91	88	35.23	-3.41	35.23

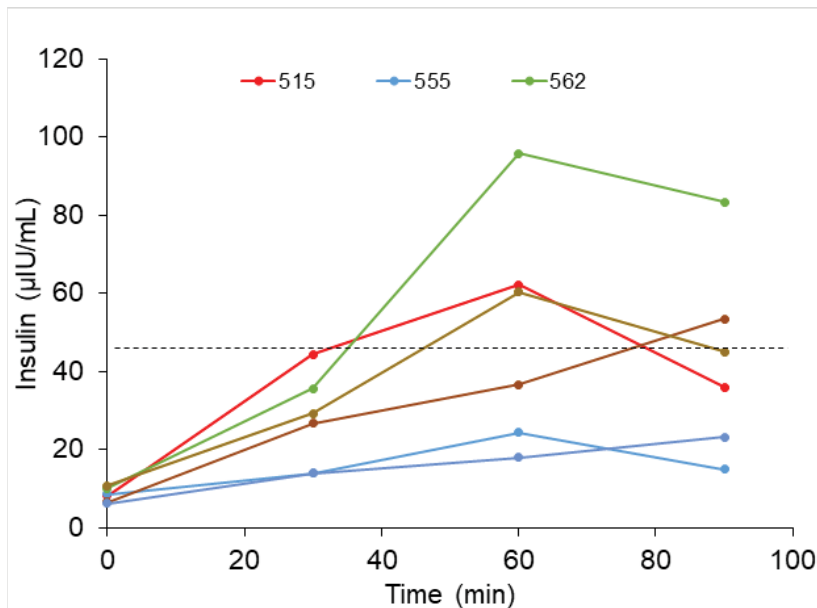


Figure 1 (above): Individual glucose values obtained via a handheld glucometer (Alphatrack2®). Mares were fasted and administered 50 mU/kg BW of insulin after time 0. The largest percent glucose drop was calculated for 40 or 60 minutes. Horses with a <40% drop in glucose are considered insulin resistant.

Figure 2 (left): Individual Insulin concentration across time for horses administered 0.15 mL/kg BW 10% Light (Coloured) Karo Syrup. Insulin concentrations above 45 µIU/mL (black dashed line) at either time 60 or 90 was deemed as insulin resistant.

Frequently Sampled Insulin Glucose Test

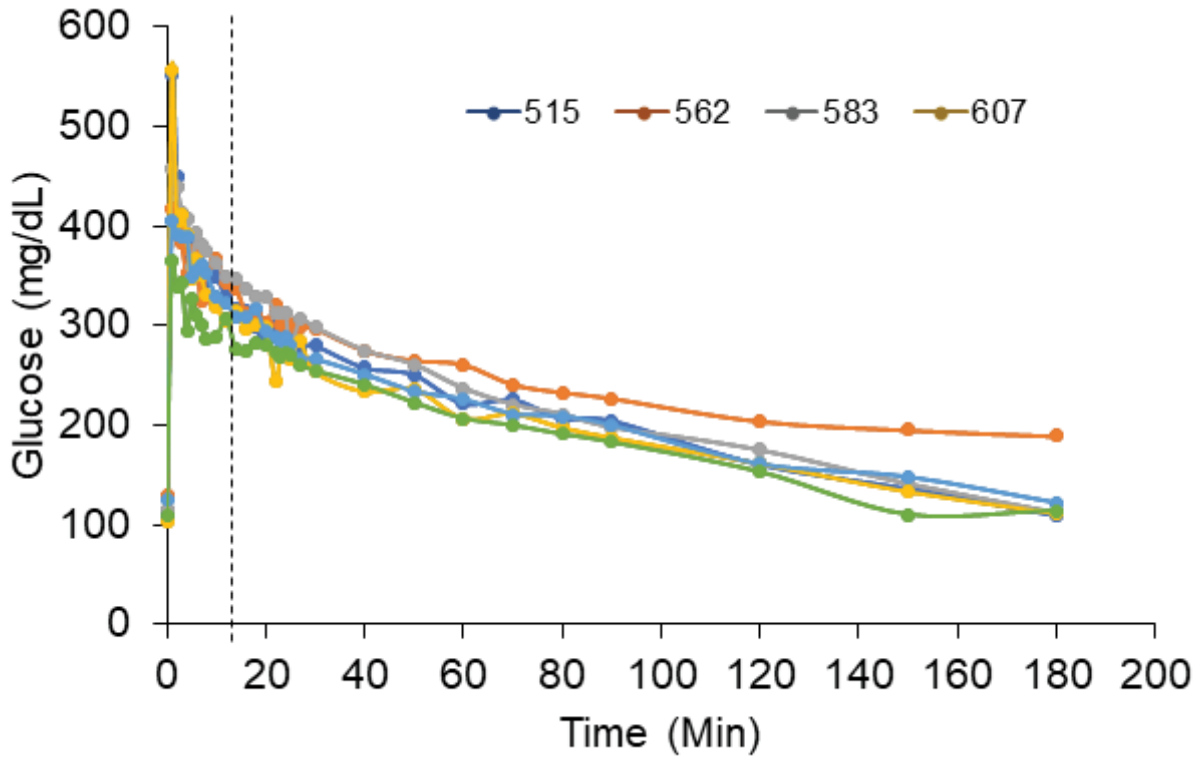


Figure 3: Individual glucose values obtained via a handheld glucometer (Alphatrack2®) during the frequently sampled insulin glucose test. Glucose (50% dextrose solution; 300mg/kg BW) and insulin (Novolin®; 0.015 U/kg BW; dashed line) were administered at 0 and 20 minutes relative to glucose infusion.

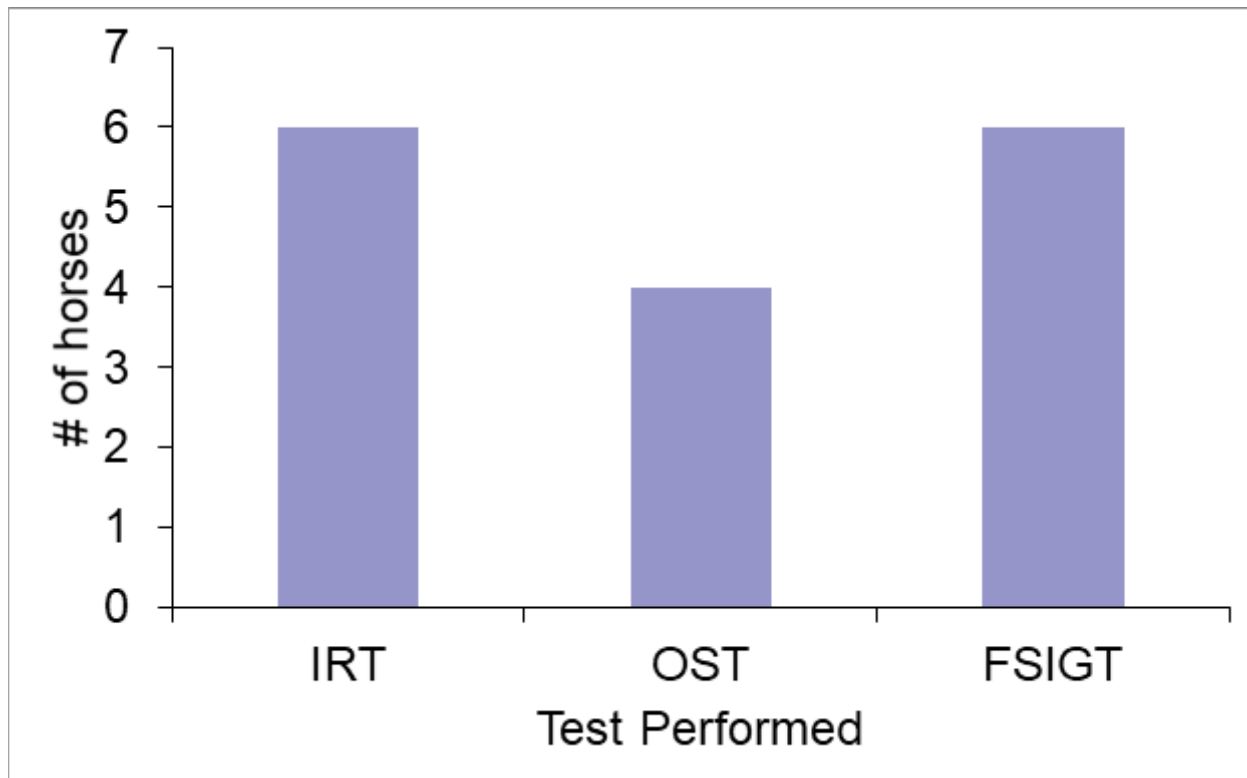
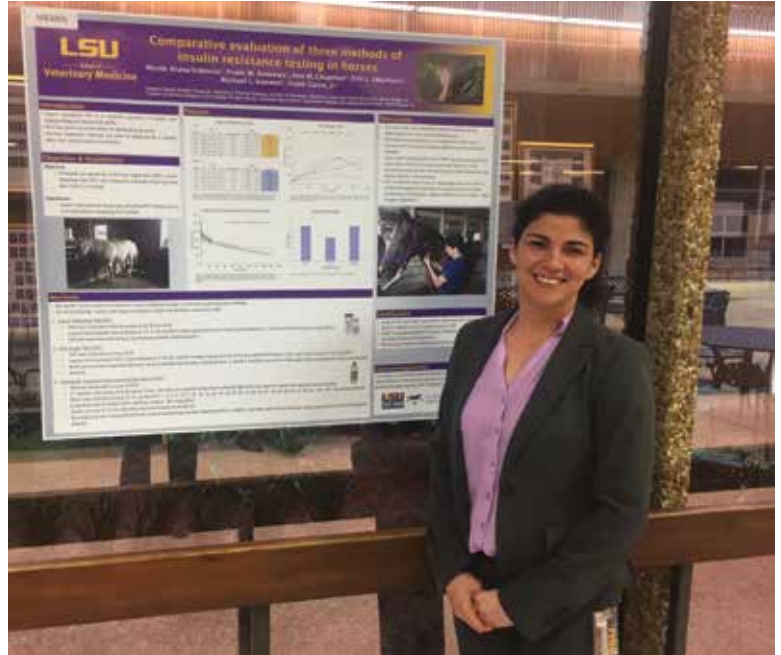


Figure 4: Comparative numbers of horses correctly diagnosed as insulin resistant.

Discussion

- IRT is an easy and repeatable diagnostic test that can be performed in one hour with immediate results.
- IRT determined all animals to have less than a 40% drop in glucose after insulin administration deeming them insulin resistant.
- Upon insulin administration in the FSIQT, glucose values should have begun to drop if animals were insulin sensitive. In all animals, glucose remains elevated possibly determining them as insulin resistant.
- OST is relatively easy; however, inaccuracies can occur due to insufficient ingestion of glucose (uncooperative horse, quality control from manufacturer), gastric conditions (full or empty), and rate of gastric absorption.



Conclusions

- FSIQT is considered the gold standard for insulin resistance testing; however, it is labor intensive and expensive.
- The FSIQT and IRT detected IR in 100% of horses, whereas the OST was only able to detect IR in 75% (4/6) horses.
- IRT was easy and produced the same results as the more labor intensive FSIQT.
- IRT might be preferable to other tests for diagnosing IR in horses.

Acknowledgements

The authors would like to thank the student workers who aided in data collection of this study as well as the LSU SVM Summer Scholars Program and the LSU Foundation.



Ex vivo Assessment of Structural Integrity of Digital Lamellar Explants and Effects of High Concentrations of Insulin

Authors/Investigators

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Introduction

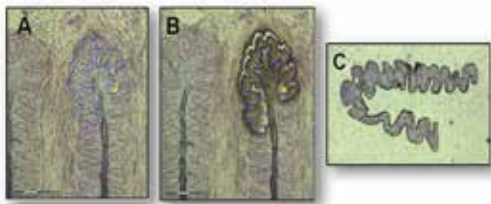
- Hyperinsulinemia-induced laminitis results in stretching of the epidermal lamina followed by failure resulting in debilitating pain and can be life threatening for the horse.
- Hyperinsulinemia-induced laminitis is associated with activation of signaling pathways downstream of insulin-like growth factor-1 receptor activation.

Objective

The objective of this study was to determine if high concentration of insulin would negatively lamellar integrity allowing for mechanical failure to occur with less load when compared with controls.

Methods

- Lamellar explants were harvested from both forefeet of 5 horses euthanized for reasons other than laminitis.
- Explants were 5x5 mm blocks and were comprised of hoof wall, epidermal lamellae, dermal lamellae and distal phalanx (Figure 1).
- Explants were incubated in medium for a 10-hour equilibration period followed by an 8-hour incubation with either media only (negative control) or media with the addition of insulin (2.5 ug/ml).



- Lamellar failure was tested for each explant using mechanical load applied by an Instron Mechanical Testing Device (Figure 1) with a 2kN maximum load cell at a constant elongation

rate of 25 mm/minute.

- Site for each failure was confirmed visually and histologically (Figure 2)
- Load to failure, stress to failure, and extension to failure was determined

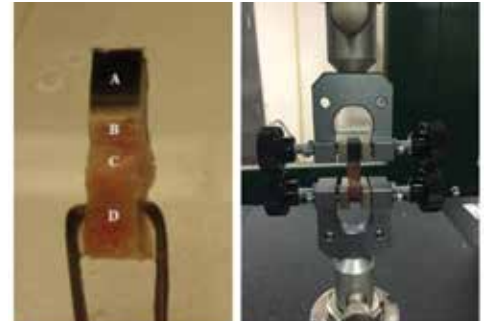


Figure 1. Hoof wall explants (5 x 5 mm) containing of hoof wall (A), epidermal lamellae (B), dermal lamellae (C), and distal phalanx (D). Image to the right demonstrated explant in the Instron Mechanical Testing System.

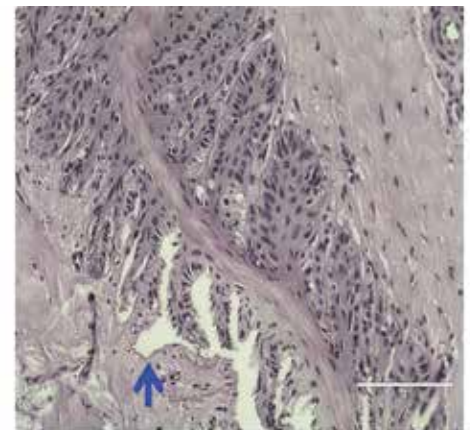


Figure 2. Histological section (10x) of lamellae of failed explant incubated in insulin with PAS stain shows failure at the junction of the epidermal and dermal lamellae (blue arrow).

Results

Failure within the lamellae occurred in 80/87 explants. Explants incubated insulin required significantly ($P=0.00056$) less load to failure at 51.28 N compared to controls at 62.38 N (Figure 3). Explants incubated in insulin also required significantly less stress to failure ($P=0.0045$) compared to controls and required significantly greater extension to failure ($P=0.035$) compared to controls.

Conclusions / Take Home Message

This ex vivo mechanical testing model provides an effective method for evaluating lamellar structural integrity. The addition of insulin to the media resulted in weakening of the lamellae with failure occurring with less load than what was applied to the control explants. Further studies evaluating therapy for hyperinsulinemia-induced laminitis can be performed by using this model.

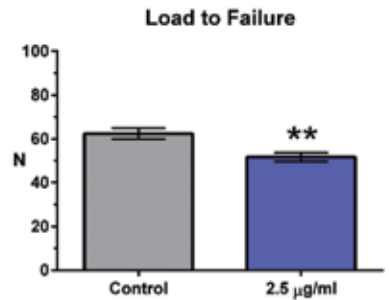


Figure 3. Mean (\pm SEM) load to failure (Newtons, N) for control (n=36) and insulin-treated (n=44) explants. ** $P<0.001$

Funding

Funding for this project was provided by the Charles V. Cusimano Equine Health Studies Grant

Year Completed

2017

Effects of Altered Weight-Bearing on Digital Perfusion in Horses

Authors/Investigators

Nicolas Garcia-Abarca, DVM, Catherine Koch, Laura Riggs DVM, Ph.D., DACVS, Ann Chapman DVM, DACVIM, Britta Leise, DVM, Ph.D., DACVS

Introduction

- Laminitis is a severely debilitating and life threatening condition of the equine foot
- Support laminitis (SSL) occurs secondary to increased weight bearing in one limb (contralateral limb) due to altered weight bearing in opposite limb due to fracture, soft tissue injury and/or musculoskeletal infection



	CONTROL			CAST / NO SHOE			CAST / SHOE		
	Early lateral	Unweighted Lateral	Late Lateral	Early lateral	Unweighted Lateral	Late Lateral	Early lateral	Unweighted Lateral	Late Lateral
Coronary Plexus	2	2	2	2	3	2	2	2	2
Dorsal Lamellar Vessels	3	3	3	2	3	3	3	3	3
Lamellar Circumflex Junction	4	4	4	3	4	4	3	4	4
Digital Cushion	3	2.5	2.5	3	2	2	3	2	2
Terminal Arch	3	2.5	2	3	2	2	2	2	2

Figure 2; Table 1. Perfusion assessment in the predetermined vascular regions, reported as median venogram grades. 1 = No fill; 2 = Reduced fill; 3 = Normal fill, 4 = Increased fill.

- Application of a cast is frequently employed in these cases and is known to increase the risk of SLL
- Cast application results in limb disparity and alters weight bearing
- Vascular occlusion during increased load has been demonstrated through venography where vascular fill was impeded by unweighting the contralateral limb

Objectives

The objectives of this study were 1) to determine if application and wear of a distal limb cast would increase periods of non-weight bearing in the casted limb, 2) to determine if this non-weight bearing in the casted limb would result in decreased venous perfusion in the contra-lateral weight bearing limb and 3) to determine if the addition of mechanical support on the contralateral limb would improve venous perfusion in the contralateral limb and weight bearing in the cast-limb.

Methods

Eight healthy horses were used in a crossover-design. One of 3 treatments were applied to the forelimbs: 1) negative control = no cast / no support shoe on contralateral limb, 2) distal limb cast / no support shoe on the contralateral limb or 3) distal limb cast / and Nanric Ultimate™ support shoe on the contralateral limb (Figure 1). The following was assessed in applied:

- Digital venography was performed as previously described
- Limb length disparity was measured between the casted and supported limb radiographical
- Cast comfort was assessed subjectively
- Frequency of weight shifting / bearing was determined through the application of pedometer

Results

- There were no significant differences noted between the venogram grades between treatment groups (Figure 2).
- Application of a distal limb cast without a support shoe resulted in significant limb length disparity which appeared to increase discomfort in horses with cast compared to controls or horses without a support shoe (Figure 3).
- Although it was noted that horses with a distal limb cast would frequently stand with the casted limb pointed forward, there was no significant difference in the number of steps per hour between treatment groups (Figure 4).

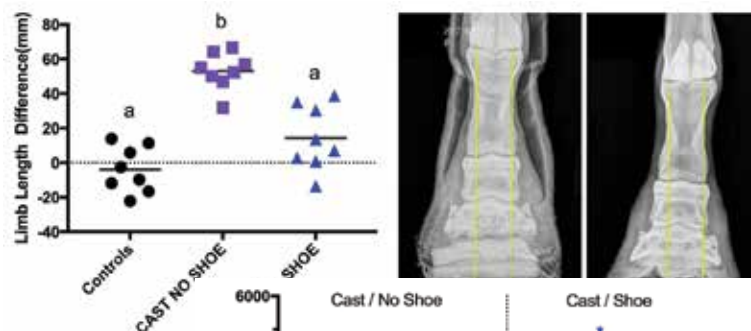


Figure 3: Limb length disparity radiographs. Casting (A) will

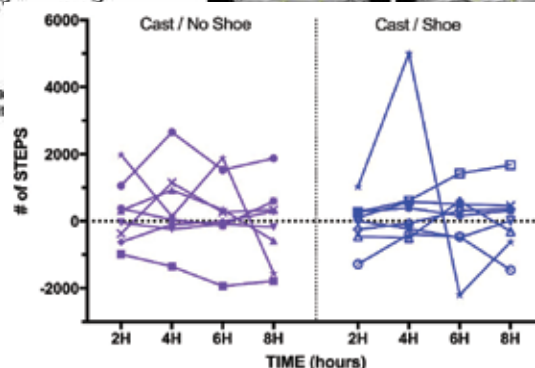


Figure 4: Pedometer measurements (# of steps) from the support limb recorded over a 8-hour period. Each horse is represented on the graph by a different symbol. Values were adjusted over the control (no cast, no shoe) measurement. No significant differences were noted in either group at any time throughout the study.

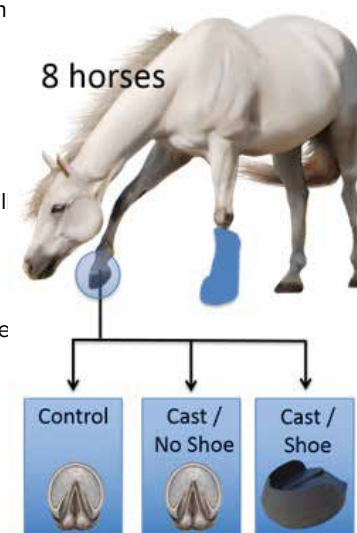


Figure 1. Experimental design. The 3 treatments were (1) **control** = no cast, no support shoe (2) **cast/no shoe** = distal limb cast, no support shoe (3) **cast/shoe** = distal limb cast, and Nanric Ultimate® shoe.



Conclusions/Take Home Message

Application of a distal limb cast in normal horses worn for 48 hours did not demonstrate a difference in venous perfusion of the contralateral limb that could be seen via digital venography. However, this modality may not be sensitive enough to see changes early in the cast wearing period. Limb length disparity in horses with a cast without a shoe and subjective comfort grade while wearing the cast suggest that providing mechanical support to even weight bearing would still be beneficial in clinical cases that require casting for therapeutic reasons.

Funding

Funding for this project was provided by NIH Summer Scholars Research Fund and the LSU Department of Veterinary Clinical Sciences

Year Completed

2018

Effect of multiple head positions on intraocular pressure in healthy, anesthetized horses during hoisting

Authors/Investigators

Alling, C.R., Cremer, J., Liu, C.C., Lewin, A.C., Camacho-Luna, P., Carter, R.T.

Date Issued

Presented in 2020 at the American College of Veterinary Ophthalmology Virtual Conference

Introduction

Intraocular pressure (IOP) variation during general anesthesia presents a risk to equine patients with fragile corneal lesions or glaucoma. Vertical head position has been shown to have a significant effect on IOP in standing horses with higher pressures recorded when the head is positioned with the eyes below heart level. Additionally, a significant increase in IOP has also been observed in anesthetized horses in both dorsal recumbency and hoisted, inverted positions. However, the effect of variable vertical head position of horses in hoisted inversion has not been previously investigated.

Objective

To evaluate changes in intraocular pressure (IOP) with variable head position in healthy, anesthetized horses in the inverted, hoisted position and to assess the influence of various cofactors (age, sex, body weight, body condition score, and neck length) on IOP changes during hoisting.

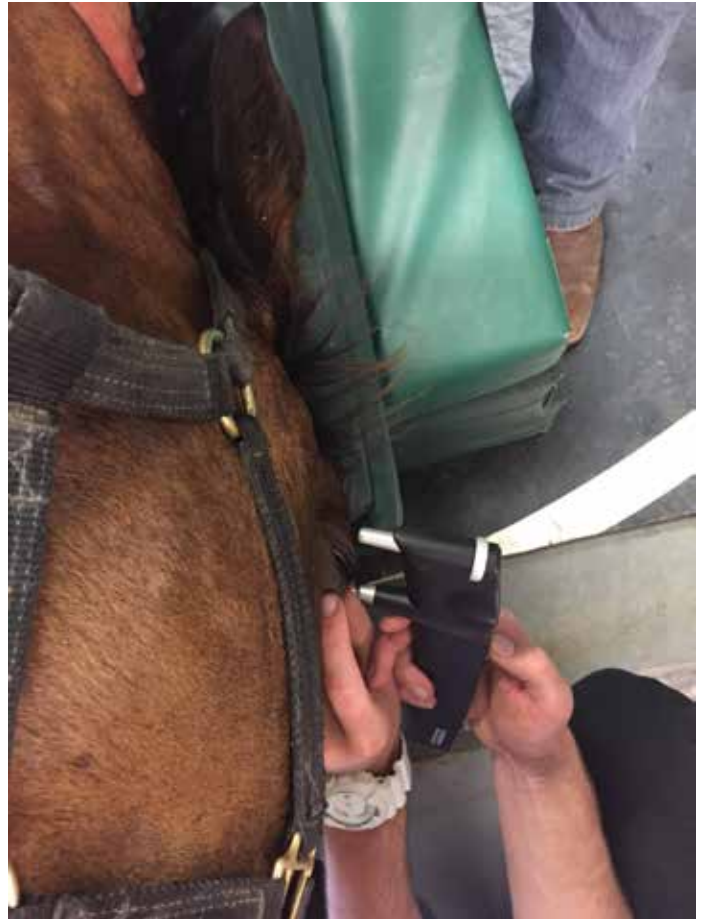


Methods

Subjects were administered intravenous xylazine/butorphanol premedication and ketamine/midazolam induction with additional xylazine/ketamine boluses for anesthetic maintenance. While hoisted, IOP was measured in triplicate for each eye via rebound tonometry (TonoVet) at neutral head position (i.e. eyes level with the withers), at multiple 5 cm increments above and below neutral (-20 cm through +20 cm) using foam pads for head support, and with eyes above heart level via manual support.

Results

In hoisted positions, IOP ranged from 18 to 51 mmHg. IOP significantly decreased with head position elevated $\geq +15$ cm from neutral and significantly increased when lowered ≤ -5 cm from neutral. Neck length significantly influenced IOP ($p = 0.0328$) with linear regression indicating a median (range) increase of 0.244 (0.034 – 0.425) mmHg in IOP for every 1 cm increase in neck length. Age, sex, breed, body weight, body condition score, and eye (OD vs. OS) did not significantly influence IOP. IOP only varied significantly between eyes at +10 cm above neutral (OS > OD, 1.7 ± 0.6 mmHg, $p = 0.0044$).



Take Home Message

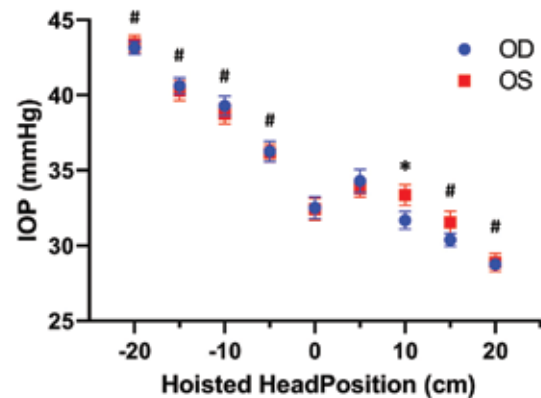
IOP in healthy, anesthetized horses varies with head position during hoisting. Increased neck length may be associated with larger changes in IOP during hoisting. Head position should be considered during hoisting for patients with fragile corneal lesions or glaucoma due to the potential risks for high IOP in these patients, and efforts should be taken to raise the head closer to heart level to mitigate increases in IOP.

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Development of Models for the Pathomechanical Analysis of Equine Navicular Disease

Authors/Investigators

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Introduction

Chronic lameness in horses is often associated with progressive degenerative tissue lesions similar to those of osteoarthritis (OA), a major public health problem in humans [1-9]. In human medicine, because therapeutic approaches focused on treating specific lesions (e.g., pharmacotherapy and direct chondral repair) have mostly failed, pathomechanical forces are now recognized as being the root cause of tissue damage in OA. Aberrant, or pathomechanical, forces impact both bone and cartilage cells directly inducing the release of inflammatory mediators and progressive tissue degeneration [9]. These observations indicate that unless the causative mechanical forces are corrected, many chronic degenerative bone and joint diseases will continue to progress. Because of this, the therapeutic focus in human medicine is shifting to approaches that ‘unload’ the affected joints through targeted exercise [10-11].

Comprehensive biomechanical analysis is common in designing training programs to optimize athletic performance and facilitate injury recovery in human athletes [11], but is less commonly done for equine athletes. Our overarching goal is to establish pathomechanical models of equine lameness that can be used to develop individualized preventative and rehabilitative therapies to improve the health of equine athletes. To reach this goal, we have created a 4D equine skeletal model based on CT data that is useful in modeling differences in the functional anatomy of the horse, including regions (i.e., the spine) in which movement and position are not as easily discernible to the naked eye as others (i.e., the lower limb).

Objective

Our objective for this study was to develop an accurate, manipulatable equine skeletal model to be used in functional anatomical and force analyses. To be useful to equine clinicians and researchers, this model needed to be biologically realistic so as to enable accurate anatomical positioning, allow for easy and accurate adjustments for modeling various postures of healthy and non-healthy horses, be able to be animated to study the effects of various gaits, and facilitate repeatable re-creations of positions and movements.

Materials and Methods

A 3D graphic equine skeletal model was built from CT data in which the positions of bones relative to each other could be manipulated and then animated to match movements from videos of a horse in motion, thus creating a 4D equine skeletal model. Depending upon what best fits the question to be addressed, the model can be used in 2D, 3D and 4D versions or in various combinations to illustrate and characterize the pathomechanical effects of specific positions, or postures.

Segmentation

Equine anatomical specimens from the University of Georgia College of Veterinary Medicine and the Louisiana State University School of Veterinary Medicine were CT scanned. The resulting CT DICOM data were imported into Avizo® 3D visualization software

(VSG, Visualization Science Group, Inc., Burlington, MA) and individual bones were segmented into individual data sets (i.e., bone meshes) (Fig. 1). The individual 3D bone meshes were then imported into the 3D animation software Maya® (Free student version; Autodesk, Inc., San Rafael, CA) where they were assembled into a complete equine skeleton in preparation for rigging, a graphic method of connecting the bone meshes so that their movements are linked (Fig. 2).

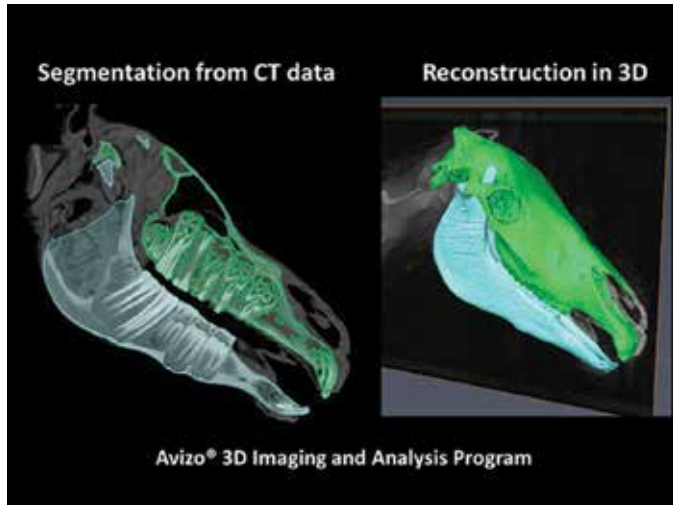


Fig. 1 Individual 3D bone meshes.

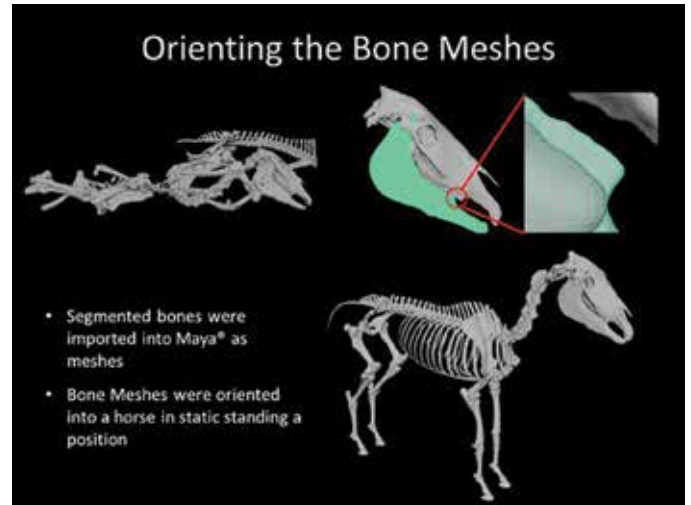


Fig. 2. Preparing the bone meshes for rigging.

Rigging

In Maya, an animation software that is used by graphic designers to animate cartoons and video games characters, the model was rigged using three separate systems (i.e., forelimbs, hind limbs, spine) that were eventually integrated into a whole. The system for each forelimb and hind limb were rigged in the same manner using “standard joint chains” with “IK handles” that drive the movements of each of the limbs (Figs. 3,4). The rigging system for the spine used the ribbon spine method, in which separate graphic joints are created and attached to a plane (Figs. 5,6). This method of rigging allows for more precise manipulations that create a more natural movement of the spine in the form of stretching, twisting, and bending.

For each rigging system, controls were created that allow for manipulation of the model as a whole (Fig. 4). The individual rigs were bound together using constraints to make a cohesive model. The skeletal meshes were then bound to the rigging using the “bind skin” mechanic in Maya, thereby completing the model and allowing the skeletal meshes (i.e., 3D bones) to move with the graphic rigging systems.

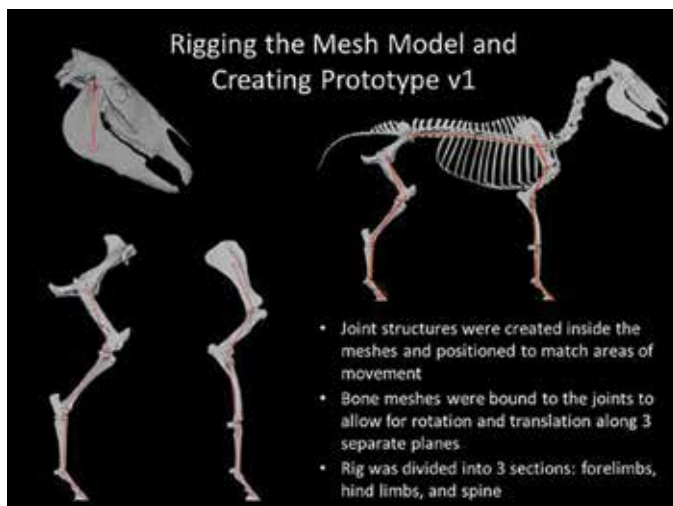


Fig. 3 Rigging the model.

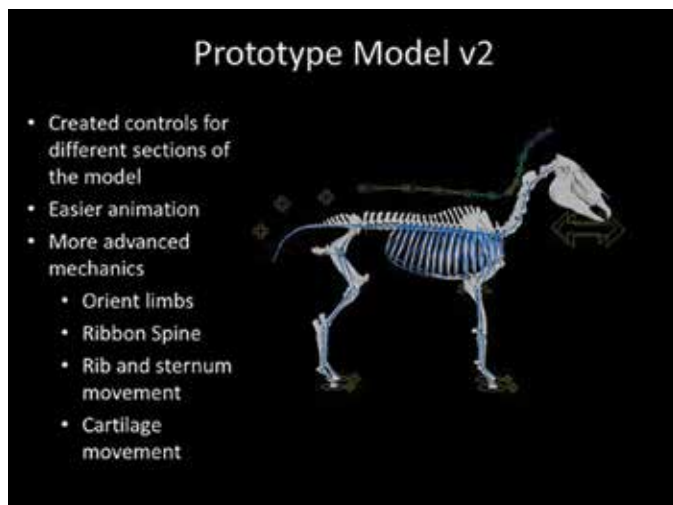


Fig 4. Controls for easier manipulation.

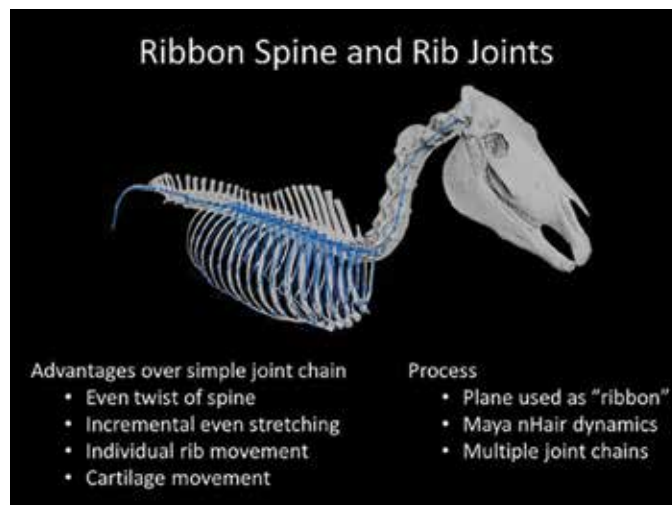


Fig 5 Ribbon spine with bone mesh.

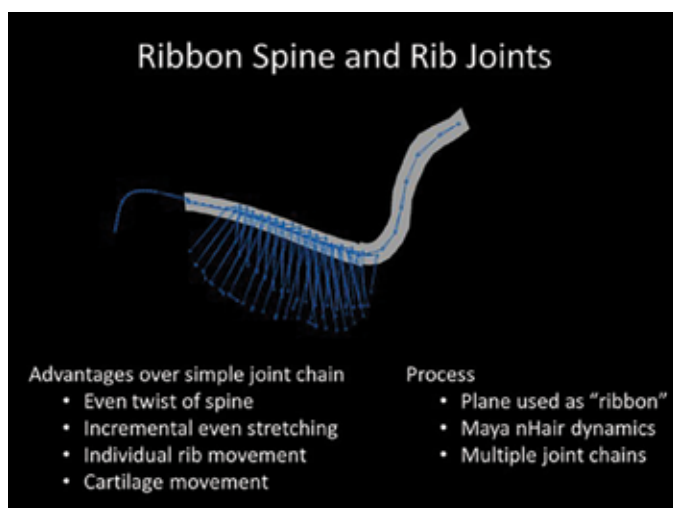
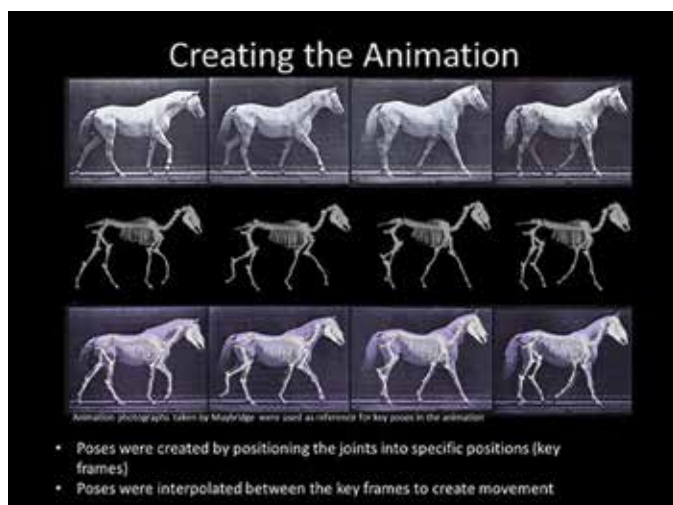


Fig. 6. Ribbon spine, graphic version.

Positioning & Animation

Using Autodesk Maya®, the dynamic 3D equine skeletal model was positioned to match photographs of horses in different postures and in different phases of movement. As proof of concept, animation in Maya was achieved using reference frames from the walking



horse as photographed by Muybridge [12]. The skeletal model was superimposed over the frames for positioning (Fig. 7). These position frames were keyed along a timeline of the animation; automatic interpolation between the key frames in Maya creates an animation.

Fig. 7. Proof of concept: overlaying dynamic equine skeletal model over Muybridge photos.

Results

The result of the method was a dynamic 3D full equine skeletal model inside Autodesk Maya® that allows for accurate anatomical

positioning and movement simulations. The model itself has a graphic rigging system delegated to the forelimbs, hind limbs, spine, neck, and ribcage. The movements of the 4D model (in motion) have been compared to videos from the side, back, and front, as well as with overhead drone footage to more accurately depict the motion of the spine and video of horses at the walk, canter, and trot to create animations of those gaits.

Discussion and Conclusions

We created a realistic dynamic skeletal equine model created from CT data using Avizo and Autodesk Maya, a program that does have a learning curve and is currently required to use the model.

The forelimbs, hind limbs, spine, and ribcage are all rigged and have controls attached that allow for easy manipulation of the model for realistic and accurate positioning and animation.

The protocol used to create the model allows for repeatability and future alterations to suit the needs of the specific horse being rigged, enabling the ability for individualized analysis. Additionally, this graphic rigging protocol can be applied to model other animals.

The use of the “ribbon spine” allows for more realistic movement of the spine during animations. This is important as the spine in horses, as has been found in humans, is often the origin of issues that are potentially related to aberrant biomechanical movements and injury to the limbs. A strength of our model is the ability to accurately demonstrate spine positions, like the transversal vertebral rotations [13] (Figure 2) and how they impact the limbs in three dimensions during various gaits.

Our dynamic 3D equine skeletal model, when used in combination with functional anatomical or force analyses, can be used to better understand how specific equine body positions, especially those adapted during athletic function, can lead to degenerative tissues changes.

When animated into 4D, the model can be used to demonstrate unhealthy and healthy skeletal movements in horses, thus being an important tool in developing individualized preventative and rehabilitative therapies for horses.

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Acknowledgements

The authors would like to thank the LSU School of Veterinary Medicine's Equine Health Study Program for funding.

- LSU School of Veterinary Medicine Anatomy Lab for anatomical specimens
- Dr. Martha Littlefield; Mr. James Ray
- UGA College of Veterinary Medicine Anatomy Lab
- Dr. Ajay Sharma for CT scans
- Dr. Steve Holladay, Dr. Carla Jarrett, Mr. Brent Norwood for anatomical specimens
- LSU School of Veterinary Medicine Functional and Evolutionary Anatomy Lab
- Jeremy Baker
- Joshua Maciejewski
- Daniel Pazooki
- Sarah Langlois

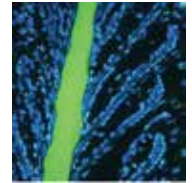
Interleukin Effects on Equine Progenitor Cells

Authors/Investigators

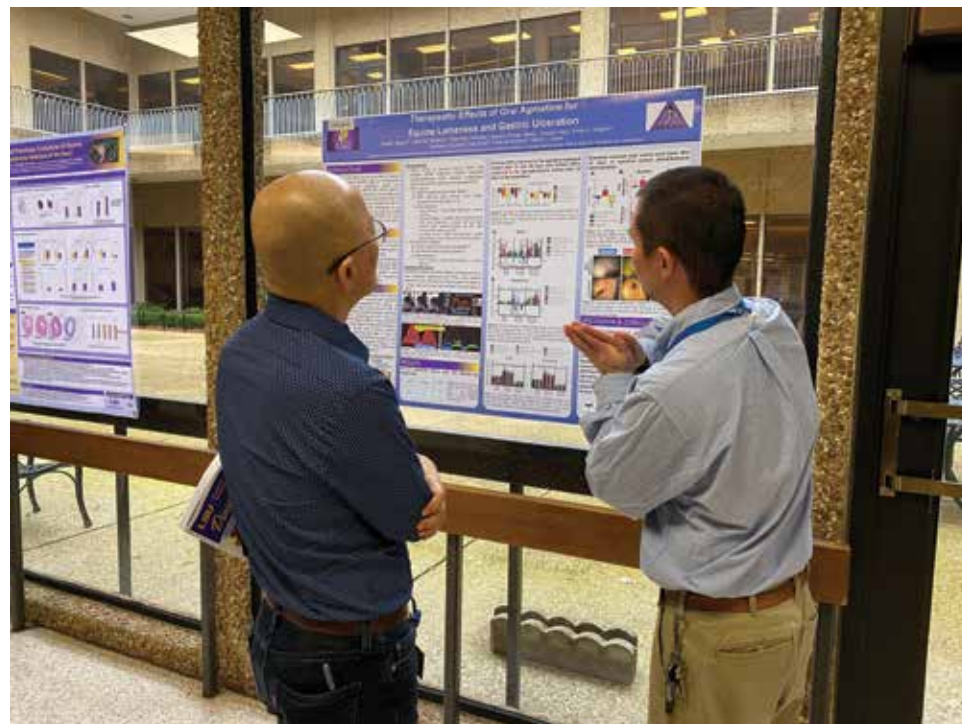
Qingqiu Yang and Mandi J. Lopez

Abstract

Progenitor cell mesenchymal versus epithelial differentiation may cause scarring of equine hoof stratum internum (SI) when inflammatory mediators are present. The hypothesis of this study was that interleukins increase mesenchymal characteristics in SI K14+CD105+ progenitor cells. Percentages of K14+CD105+ cells from fibrous and normal SI were quantified. Decellularized matrix was prepared from, and K14+CD105+ cells localized in, normal SI. Gene expression (CD44, CD105, E-cadherin, N-cadherin, β -catenin, K1, K10, p63, TGF- β 1, - β 2, - β 3) and E-cadherin+ and N-cadherin+ cell percentages were determined in continuously cultured cells. Revitalized K14+CD105+ cells were cultured in stromal medium with or without interleukins (IL) 2 and 6 or on decellularized SI matrix. Gene expression (K1, K10, p63, β -catenin, TGF- β 1, - β 2, - β 3), E-cadherin+ and K14+ cell percentages and culture medium TGF- β 1 were quantified. Cell filamin-A and heat shock protein (HSP)- β 1 proteins were evaluated after stromal medium +/- IL culture. Cell-matrix microstructure was evaluated. Most cells from normal and fibrous SI were K14+CD105+, and K14 and CD105 colocalized to single cells in situ and in vitro. There were more E-cadherin+ cells and lower K1 expression in K14+CD105+ versus heterogeneous cells. K14+CD105+ cells had lower TGF- β 1, β -catenin, and K1 expression, higher filamin A and HSP- β 1 protein and lower TGF- β 1 levels in stromal medium with IL. Expression of p63 and K10 and E-cadherin+ cell percentage were highest with matrix; cells on matrix reestablished the epidermal-dermal attachment. While in vivo confirmation is necessary, results suggest that IL2 and 6 together support K14+CD105+ SI progenitor cell mesenchymal characteristics while normal matrix supports epithelial.



Therapeutic Effects of Oral Agmatine for Equine Forelimb Osteoarthritis and Gastric Ulceration



Authors/Investigators

Takashi Taguchi, Catherine Takawira, F. Morales-Yniguez, Michael Keowen, Qingqiu Yang, Emily Halpen, Gad Gilad, Frank Andrews, and Mandi J. Lopez

Abstract

Osteoarthritis accounts for up to 60% of equine lameness. Treatment largely relies on non-steroidal anti-inflammatory drugs (NSAIDs) that are often associated with equine gastric ulcer syndrome. Agmatine, an endogenous decarboxylated arginine, alleviates neuropathic pain and protects against gastric

injury. The hypotheses tested in this study were: 1) agmatine and phenylbutazone improve forelimb use more than placebo; and 2) phenylbutazone induces gastric ulceration while agmatine and placebo do not. Six adult thoroughbred horses with forelimb osteoarthritis received oral phenylbutazone (6.6 mg/kg), agmatine sulfate (25 mg/kg) or placebo (grain) every 24 hours for 30 days with 21-day washout periods between treatments. Forelimb lameness, ground reaction forces (GRFs), and plasma agmatine level were evaluated using AAEP Lameness Scale, force platform, and high-performance liquid chromatography, respectively, after 15 and 30 days of each treatment. Gastric ulceration and serum chemistries were evaluated prior to and at the conclusion of treatment. Braking GRFs were greater following 15 and 30 days of agmatine versus phenylbutazone. After 15 days of treatment, vertical GRFs were greater with phenylbutazone versus agmatine or placebo. Plasma agmatine level reached highest at 30 minutes after administration. Glandular mucosal ulcer scores were lower after 30 days of agmatine versus phenylbutazone. Short-term improvement of vertical GRFs by phenylbutazone versus consistent, long-term improvement in braking GRFs with agmatine suggests more effective and sustained reduction in forelimb lameness by the latter. The study results support long-term oral agmatine, potentially in conjunction with short-term NSAID administration, to improve limb use and prevent gastric ulceration in horses with osteoarthritis.

Equine Shoe Modifications to Enhance Traction Alter Gait Kinetics at a Trot in Non-Lame Horses

Authors/Investigators

Pengju Wang, Catherine Takawira, Takashi Taguchi, Xiao Niu, Munir D. Nazzal, and Mandi J. Lopez

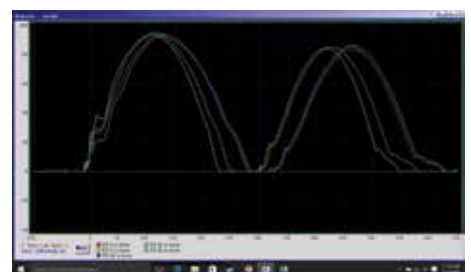
Abstract

Little information is known about shoe adaptations, including calks, plastic, or a thin layer of tungsten carbide granules on traction. The goal of this study is to quantify the effect of shoes with and without traction adaptations on kinetic measures in non-lame, light breed horses at a trot, with the hypothesis that shoes with thin layers of tungsten carbide or plastic components increase the percent change of peak braking force compared with standard shoes or shoes with low or high profile calks. In this six-way crossover, prospective study, kinetic data was collected from five adult horses while unshod and subsequently shod in random order with five distinct shoes; standard, high profile calk, low profile calk, thin layer of tungsten carbide granules and composite (steel metal frame in plastic). Kinetic variables were recorded with a force platform at a trot. The percent changes in peak vertical (PVFZ), braking (PBF), and propulsion (PPF) forces, and weight distribution relative to unshod for distinct shoe conditions were compared ($P < 0.05$). In the forelimbs, PVFZ increased with composite versus standard, high profile, low profile, and thin layer shoes. In the hind limbs, PBF increased the most with composite followed by thin layer and then low profile, all of which were greater than high profile and standard shoes. No differences were found among shoe conditions in weight distribution in fore- or hind limbs. Results support that composite and thin layer shoes are the best for traction and soft plastic offers the best hoof protection. Taken together, findings suggest that composite shoes may be the best choice for horses that work on concrete surfaces. This study provides novel, baseline information for farrier and veterinary practitioners about the effects of common shoe traction adaptations on equine gait kinetics.



LEFT: Ground Reaction Force Collection.

RIGHT: Graph of Vertical Ground Reaction Force with Multiple Trials for One Session.





STEM CELLS

Assessment of Equine Keratinocyte Wound Healing in vitro after Exposure to Bone Marrow Derived Mesenchymal Stem Cells or Lipopolysaccharide

Authors/Investigators

Shannon Connard, DVM; Alvaro Oliveira, DVM, Ph.D.; Heather Bell, MS, Britta Leise DVM, Ph.D., DACVS

Introduction

- Stem cells have been shown to promote wound healing in horses
- Stem cells can impact wound healing by paracrine immunomodulatory, antifibrotic and anti-inflammatory effects, enhance neovascularization, reversal of collagen dysregulation, and in some reports by transdifferentiation and engraftment.

Objective

The objective of this study was to determine the in vitro effect of bone marrow derived mesenchymal stem cells (BM-MSCs) on keratinocyte wound healing.

Methods

- Section of skin and bone marrow were harvested from horses that were euthanized for reasons unrelated to this study.
- Bone marrow mesenchymal stem cells (BM-MSC) were isolated and cultured in transwells (Figure 1, 2)
- Equine keratinocytes (KCY) were isolated from skin and culture-expanded to confluency in 12-well plates. (Figure 2).
- Trilineage differentiation and histological evaluation was performed to confirm the pluripotent nature of the BM-MSC (Figure 3)
- “Wounds” were created in vitro using a 200 ul pipet tip as previously described.
- Various conditions were applied to the “wounded” and “non-wounded” KCY
 - Keratinocytes only
 - Keratinocytes + BM-MSC
- 3 representative areas of the wounds were photographed using the microscope (10x objective) the following times: 0, 1, 2, 4, 6, 12, 24, 30, 36, 48, and 51 hours



Figure 1. Transwells containing BM-MSC.

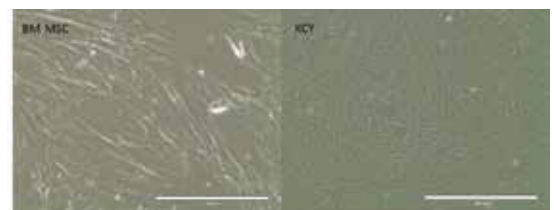


Figure 2. Isolated BM-MSC (left) and keratinocytes (KCY; right) in culture.

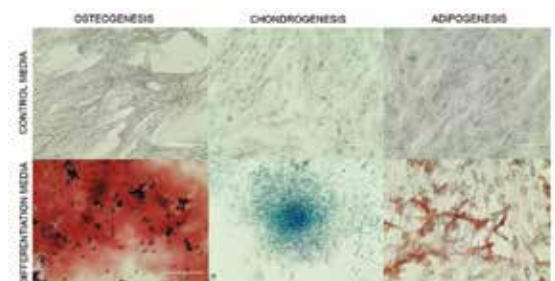


Figure 3. BM-MSC in differentiation media (bottom) compared to BM-MSC in control media (top) demonstrating trilineage differentiation including: osteogenesis (left), chondrogenesis (middle), and adipogenesis (right).

- Wounds distance was measure (with observer blinded to treatment) using image analysis software
- Data were analyzed via repeated measured two-way ANOVA and Dunnett's multiple comparisons.

Results

- Keratinocytes demonstrated significant ($P < 0.05$) migration, closing the wound gap over time (Figure 4,5)
- There were minimal differences noted between groups; however, at 48 hours there was greater migration ($P < 0.05$) in the BM-MSC treated keratinocytes compared to controls (Figure 5).

Conclusions / Take Home Message

Slight improvement in keratinocyte migration was noted with the addition of BM-MSC in the in vitro model when compared to controls. BM-MSCs may have an effect on growth factors and inflammatory mediator production and are being evaluated at this time. The results from this study suggest that stem cell may help wound healing through increased migration of keratinocytes, however clinical studies are warranted.

Funding

Funding for this project was provided by the Charles V. Cusimano Equine Health Studies Grant

Year Completed

2019

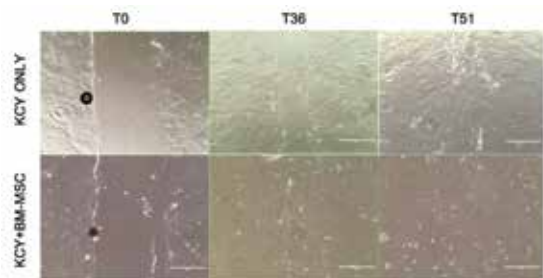


Figure 4. Microscopic images of KCY from T=0, 36 and 51 hours post wounding. KCY wounding without the addition of BM-MSC (top row) compared to KCY wounding with the addition of BM-MSC (bottom row). Note increased migration in BM-MSC treated KCY demonstrated by a more narrowed wound gap.

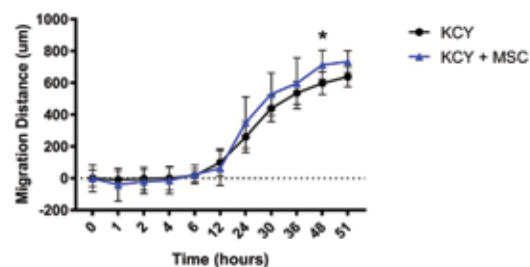


Figure 6. Comparison of migration distance of keratinocytes (KCY) and keratinocytes + BM-MSC conditions over time.

Pharmacokinetics and pharmacodynamics of clodronate disodium evaluated in plasma, synovial fluid, and urine

(Accepted for publication in Equine Veterinary Journal, Jan 2020)

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Background

Clodronate is a non-nitrogenated bisphosphonate approved for use in horses. There are no peer reviewed published reports describing the pharmacokinetics or evaluating renal health indices and urinary excretion patterns in conjunction with plasma and synovial fluid concentration following the systemic administration of clodronate to horses.

Objectives

Describe clodronate concentrations in plasma, urine, and synovial fluid and evaluate the effects on renal indices after intramuscular administration to healthy horses.

Methods

Six healthy adult horses received a single intramuscular dose of clodronate (1.8 mg/kg). Blood, synovial fluid and urine were collected prior to and after administration of clodronate up to 72, 48 and 168 hours respectively. Drug concentrations were measured using LC-MS/MS and non-compartmental pharmacokinetic analysis was performed. Renal function indices were also evaluated.

Results

Clodronate was quantifiable for up to 24 hours in plasma and 48 hours in synovial fluid and detected at all time points in urine. Maximum plasma concentration of clodronate 210 ± 68.2 ng/mL occurred at approximately 34.8 ± 0.2 minutes after administration, while peak synovial concentration (57.7 ± 32.8 ng/mL) occurred at 2.67 ± 2.32 hours after administration and peak urine concentration ($88,358.2 \pm 79,521.4$ ng/mL) occurred at 2.67 ± 2.58 hours post administration. Terminal half-life in plasma was 3.32 ± 1.25 hours and was 4.8 ± 3.05 hours in synovial fluid. Creatinine concentrations rose significantly after treatment, but remained within normal adult reference ranges at all times.



Conclusions

Clodronate is rapidly cleared from the blood and synovial fluid. It has variable and biphasic urinary excretion. While significant increase in blood creatinine concentrations were present after a single intramuscular dose of clodronate, values were never above the normal reference range. Further studies are warranted in horses undergoing exercise and those undergoing multiple dosing schemes.

Funding

Funding for this project was provided by the Charles V. Cusimano Equine Health Studies Program.

Year Completed

2018-2020

Evaluation of peer teaching and deliberate practice to teach veterinary surgery

(Published in Veterinary Surgery, 2019)

Authors/Investigators

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Objective

To assess the impact of peer teaching and deliberate practice on surgical skills acquisition and retention in first- and second-year veterinary students.

Sample Population

Eighteen first-year and 25 second-year students from 1 college of veterinary medicine who had previously demonstrated proficiency in basic surgical skills.



Methods

Forty-three participants were divided into 3 groups: the test group (group A, n = 15), who participated in a structured peer-assisted learning program using deliberate practice; the time-practice control group (group B, n = 15), who participated in an unstructured peer-supported environment; and the assessment-only control group (group C, n = 13), who participated in the assessments. Participants performed a subcutaneous mass removal on a cadaver model and were assessed via a global rating system. Three assessment points were evaluated: pre-training, immediate post training, and retention.

Results

The number of participants who achieved acceptable or excellent grand total scores in group A increased after training. Among all participants, 22% in group A, 35% in group B, and 38% in group C did not achieve an acceptable total score at the retention assessment. Conclusion: The study population improved in skill level and retention through the use of standardized video and peer instruction with attention to effective learning strategies, particularly deliberate practice.

Clinical Significance

Use and enhancement of the format introduced in this study could augment veterinary surgical education.

Year Completed

2016-2018

Effect of tiludronate on bone remodeling and regeneration in horses

Authors/Investigators

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Rationale

Orthopedic disease in equine athletes is debilitating and economically important. Tiludronate is commonly used to treat disorders associated with abnormal bone remodeling, including navicular disease and distal tarsal osteoarthritis. Administration of tiludronate has been shown to improve lameness associated with the aforementioned diseases. To our knowledge, there is currently no data effectively evaluating the influence of



tiludronate on bony tissue in a mature equine skeleton, either in the presence or absence of a diseased state, despite the prolific use to treat diseases of bone remodeling. The investigators have recently published data evaluating the direct influence of tiludronate on immature equine bone and found no effect, however further investigation is needed to determine whether bisphosphonates administered using clinical dosing regimens affect bone remodeling in the horse. The lack of scientifically controlled data supporting the use of tiludronate for treatment of bone remodeling diseases presents a direct barrier to the field of equine orthopedics.

Objectives & Hypothesis

This proposal has two objectives: i) quantify the effect of a clinically-relevant tiludronate dosing schedule on bone morphology and remodeling in the horse, and ii) quantify the effect of tiludronate on bone morphology and remodeling secondary to a bone injury.

Hypotheses

Administration of tiludronate will i) result in reduction of bone remodeling kinetics under conditions of normal remodeling and ii) an increase in bone under conditions of bone regeneration, but this bone will be of reduced quality.

Experimental Design & Methods

We propose a single experiment to accomplish both objectives. Skeletally mature horses (5 to 15 years of age) will undergo biopsy of the tuber coxae that will serve as a baseline control sample. Thirty days following this procedure, horses will be administered either tiludronate (1 mg/kg, n=15) or equivalent volume of saline (n=5). Sixty (60) days following treatment, the tuber coxae will be re-biopsied to evaluate bone regeneration following induction of an injury (i.e. the original biopsy). At 90 days, horses will receive a second dose of tiludronate or saline. The contralateral tuber coxae will be biopsied 150 days following treatment. All biopsies will be evaluated with micro-computed tomography (μ CT) and histomorphometry to quantify bone morphology and remodeling kinetics.

Preliminary Data

Preliminary data shows our method to obtain biopsies from the tuber coxae is associated with minimal discomfort and low morbidity, and the samples obtained are adequately sized and of appropriate quality to evaluate with the proposed endpoints. We have also established that there is substantial bone regeneration 60 days following initial biopsy, providing an adequate healing model. A pilot study to evaluate the effect of a single dose of tiludronate treatment on bone remodeling in skeletally immature horses showed no significant changes in bone morphology or remodeling. In addition, another identical pilot study evaluating the effect of clodronate (a comparable bisphosphonate) also did not result in any significant changes in the horse.

Expected Results

We expect that by evaluating bone morphology and remodeling at a longer time point following tiludronate administration, and following two doses instead of one, we will see significant impacts on bone remodeling kinetics and healing following induction of a bony defect.

Potential Impact for Animal Health

A significant concern within the equine field is whether tiludronate administration has beneficial effects on bone remodeling in horses. Following successful completion of this study, we will provide direct evidence of the effect of tiludronate administration on bone remodeling in the horse, including a model of bone regeneration that would provide preliminary data under abnormal remodeling conditions. Practitioners can utilize this data to accurately administer tiludronate to clients affected by diseases resulting from abnormal bone remodeling, thereby reducing the risk associated with administering tiludronate without knowledge of the resulting impact on bone remodeling at the site of injury or other sites in the skeleton.

Year Began

2019-2021

Funding

Funding for this project was provided by the Morris Animal Foundation.

The Use of Liposomal Bupivacaine as an Incisional Analgesic and its Effect on Wound Healing

Authors/Investigators

Morgan Steiner BS, Molly Patton DVM, Heather Bell MS, Anderson da Cunha DVM, Ph.D., DACVA, Colin Mitchell DVM, DACVS, Lee Ann Fugler DVM, Ph.D., Britta Leise DVM, Ph.D., DACVS

Introduction

- Bupivacaine is a local anesthetic agent used to relieve pain during surgical procedures.
- Liposomal bupivacaine (Nocita®) is comprised of nonconcentric lipid bilayers (liposomes) that encapsulate the aqueous solution of bupivacaine allowing for gradual release of the drug.
- Liposomal bupivacaine reportedly has a clinical anesthetic effect of 72 hours in people and dogs.
- Liposomal bupivacaine could provide proper incisional analgesia and increase patient comfort post-operatively, resulting in lowered requirements for additional pain medication. However, some studies have shown that liposomal bupivacaine decreases wound strength and healing in rats.

Objectives

The objectives of this study were to evaluate the use of liposomal bupivacaine for incisional anesthesia and its effects on incisional wound healing in the horse.

Methods

- 6 horses were used in this study.
- 12cm incisions were made in the paralumbar fossa through the skin and subcutaneous tissues on both the right and left side of each horse (Figure 1).
- Incisions for each horse were randomly assigned to a treatment and a control group.
 - Treatment = subcutaneous injection of 266mg (20mls) of liposomal bupivacaine (Nocita®) at the incisional margins (Figure 2)
 - Control = subcutaneous injection of 20mls of saline at the incisional margins



Figure 1. Paralumbar fossa incision.



Figure 2. NOCITA® injection into the deep subcutaneous tissue along the incision line. Image from www.nocita.aratana.com

- Incisions were monitored for skin sensation and incisional wound healing throughout the study.
 - Sensation was determined using the Electronic von Frey Anesthesiometer (Almemo®).
 - Wounds were evaluated daily for presence of edema, discharge, and dehiscence
- Biopsies were collected at the incision margin on day 0, 3, 7 and 14.
 - White blood cell infiltration at the injection site was determined via immunohistochemistry (MAC387 staining) and inflammatory mediator production determined via qRT-PCR.

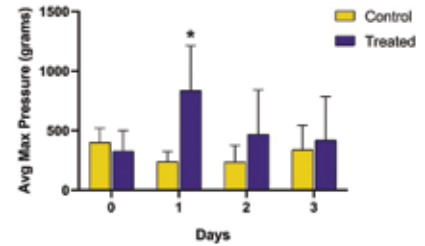


Figure 3. Average maximum pressure (grams) applied to incisional margins of horses in the control (saline; yellow) and treatment (Nocita; purple) groups. Treated incisions allowed significantly ($P < 0.05$) greater pressures compared to control incisions 24 hours post-wounding.

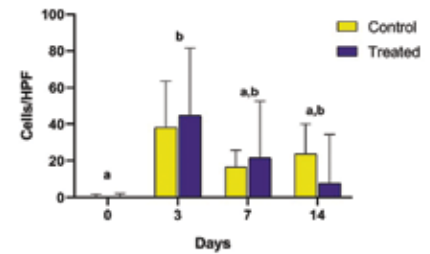


Figure 4. Number of positively stained MAC387 cells observed at 40X at days 0, 3, 7 and 14. There was a significant difference ($P < 0.05$) in number of positively stained cells between day 0 and 3. No difference was noted between treatment groups on any day evaluated.

Results

No incisions exhibited dehiscence in this study. Only mild to moderate edema and mild discharge were present in select incisional wounds. There was no significant difference in incisional wound healing score between the control (saline) and treated (Nocita®) groups. Nocita® treated wounds did allow for greater pressure to be applied at the wound margin when compared to controls (Figure 3). An increased number of neutrophils and macrophages demonstrated by increased MAC387 staining was noted at all incisional margins after wounding, however there was no difference in the number of these cells between groups (Figure 4, 5).

Conclusions / Take Home Message

Liposomal bupivacaine (Nocita®) administered at the incisional margin resulted in decreased sensation (i.e. less pain) when compared to saline injection. While this difference was only statistically significant at day 1 post-operatively, some horses had decreased sensation for up to 7 days. Liposomal bupivacaine did not affect wound healing, as no difference was noted in the clinical parameters of incisional edema or discharge. Liposomal bupivacaine did not alter the inflammatory response, as determined by white cell migration to the incisional margin; however, further evaluation of inflammation via RT-PCR analysis of pro-inflammatory cytokines is ongoing. Nocita® appears to provide incisional anesthesia for at least 24 hours post-surgery without affecting incisional healing, therefore should be considered for use in horses to control incisional pain.

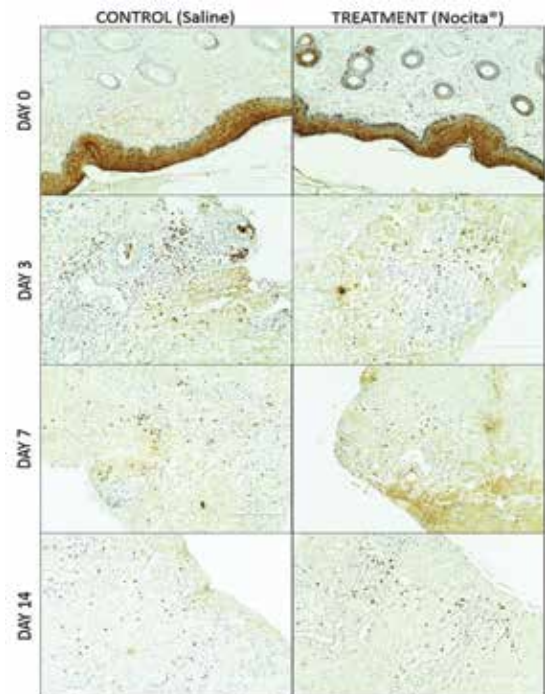


Figure 5. MAC387 staining in control and treated incisions from a horse at days 0, 3, 7 and 14 at 20X magnification. Positive (brown) cells demonstrate neutrophils and macrophages at the incisional margin.

Funding

Funding for this project was provided by the NIH Summer Scholars Research Fund and the LSU Equine Health Studies Program.

Year Completed

2019



Evaluation of peer teaching and deliberate practice to teach veterinary surgery

(Published in Veterinary Surgery, 2019)

Authors/Investigators

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2Kansas State University College of Veterinary Medicine, Manhattan, Kansas

3Department of Veterinary Clinical Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA, USA

Objective

To assess the impact of peer teaching and deliberate practice on surgical skills acquisition and retention in first- and second-year veterinary students.

Sample Population

Eighteen first-year and 25 second-year students from 1 college of veterinary medicine who had previously demonstrated proficiency in basic surgical skills.

Methods

Forty-three participants were divided into 3 groups: the test group (group A, n = 15), who participated in a structured peer-assisted learning program using deliberate practice; the time-practice control group (group B, n = 15), who participated in an unstructured peer-supported environment; and the assessment-only control group (group C, n = 13), who participated in the assessments.

Participants performed a subcutaneous mass removal on a cadaver model and were assessed via a global rating system. Three



assessment points were evaluated: pre-training, immediate post training, and retention.

Results

The number of participants who achieved acceptable or excellent grand total scores in group A increased after training. Among all participants, 22% in group A, 35% in group B, and 38% in group C did not achieve an acceptable total score at the retention



assessment. Conclusion: The study population improved in skill level and retention through the use of standardized video and peer instruction with attention to effective learning strategies, particularly deliberate practice.

Clinical Significance

Use and enhancement of the format introduced in this study could augment veterinary surgical education.

Year Completed

2016-2018

The role of kisspeptins in equine trophoblast cell dynamics: A potential modulator of cellular invasion and apoptosis

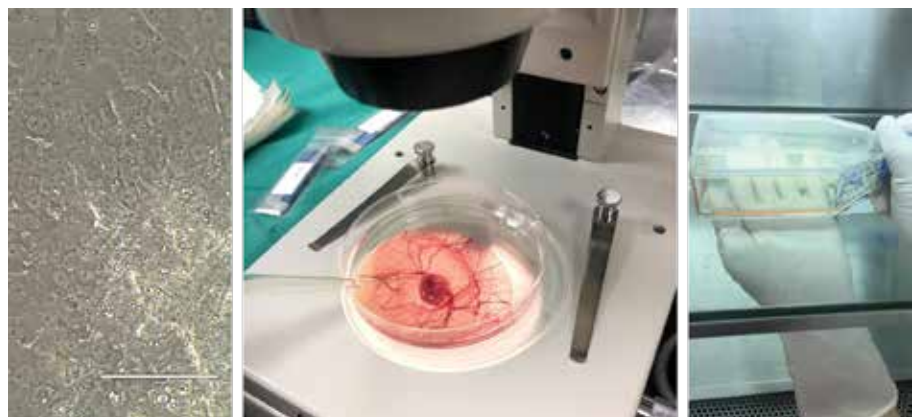
Authors/Investigators

Viviane C. L. Gomes¹, Victoria Bailey², Caroline Camp², Cassandra R. Crissman², Olivia Geels¹, Kalie Beckers¹, Erin L. Oberhaus², Christianne Magee³, Jenny L. Sones¹

¹Department of Veterinary Clinical Sciences, School of Veterinary Medicine, Louisiana State University; ²Department of Animal Sciences, School of Animal Sciences, Louisiana State University; ³Department of Biomedical Studies, College of Veterinary Medicine, Colorado State University

Introduction

The placenta has a major importance in the gestational development of a healthy foal. Transient tissues of the equine placenta named endometrial cups have a critical role in pregnancy maintenance. These structures are formed by invasion of the mare's uterus by embryonic trophoblast cells. With a short lifespan, the endometrial cups normally degenerate at the end of the first trimester of gestation. Despite their importance, the mechanisms regulating the cellular



dynamics in endometrial cup development and demise remain poorly understood.

Inadequate trophoblast cell invasion may lead to early pregnancy loss, a condition that affects 5 – 15% of pregnancies, causing major economic losses to the equine industry. If the event of pregnancy loss after endometrial cup formation, the retention of these structures for their normal lifespan will prevent the mare's return to regular cyclicity for the remainder of the breeding season. Therefore, besides the forfeit of a potential foal, the producer will also have loss of revenue associated with maintenance of a barren mare. Importantly, pathologically persistent endometrial cups may occur after abortion or normal parturition, leading to long term infertility. Scarce anecdotal treatment options have been described for persistent endometrial cups, with unproven efficacy.

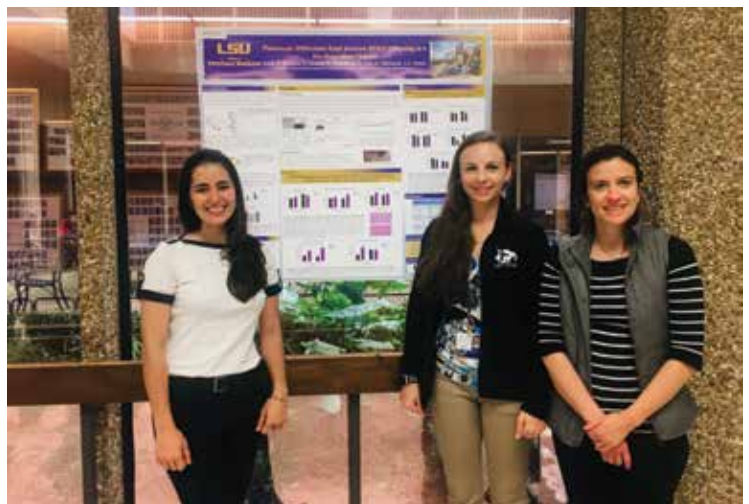
Kisspeptins (KP) are small peptides with major importance in reproductive function across species. These peptides have been associated with regulation of trophoblast cell invasion in humans and rodents. It has been proposed that KP inhibits trophoblast cell migration, regulating the degree of invasion of the maternal uterine tissue. Moreover, KP has been associated with trophoblast programmed cell death, an important process for placental detachment during delivery. Human blood KP levels and placental expression have been associated with recurrent pregnancy loss, fetal growth restriction and early onset of pre-eclampsia. The degree of trophoblastic endometrial invasion differs between mares and women, yet numerous similarities exist between equine and human pregnancies, including trophoblast cell architecture.

Objectives

While work to evaluate the role of KP in pregnancy continues in the human field, our group is the only team of reproductive scientists and Theriogenologists studying these peptides in equine pregnancy. Preliminary studies have shown high KP blood levels in pregnant mares and KP expression in the endometrial cups. Therefore, the overarching objectives of our study are to characterize the spatiotemporal expression of KP by the invasive endometrial cup precursor cells and surrounding uterus and investigate the role of KP in trophoblast cell migration, invasion and programmed cell death in this species.

Experimental Design

- Embryos and uterine samples were collected from healthy mares (n= 7) immediately before invasion of endometrial cup precursor cells, known as the chorionic girdle trophoblast cells, into the maternal uterus (day 34 post-ovulation). Tissues were dissected and cryopreserved for future analysis.
- Conceptuses and uterine samples were collected from 8 healthy pony mares during initial endometrial cup development (days 40 – 45 post-ovulation, n = 4) and endometrial cup degeneration (days 95 – 100 post-ovulation, n = 4). Tissue samples were stored via both cryopreservation and paraformaldehyde fixation and paraffin embedding.
- Characterization of spatial and temporal KP (Kiss1) and KP receptor (Kiss1r) gene and protein expression levels are in progress. Molecular analysis include Real Time PCR, Western Blotting and Immunohistochemistry.
- Molecular pathways associated with KP activity will also be investigated via spatiotemporal expression levels of matrix metalloproteinases (MMP), tissue inhibitors of MMP, and pro-apoptotic molecules (programed cell death).



- Endometrial cup precursor cells have been collected and cultivated in vitro for KP functional assays. The role of equine Kisspeptin-10 (eKP-10) in equine chorionic girdle trophoblast cell migration and invasion is being investigated via wound healing scratch assay, vesicle expansion and Boyden chamber invasion assays. Moreover, the pro-apoptotic role of eKP-10 will be investigated via deoxynucleotide transferase (TdT)-mediated dUTP- digoxigenin nick-end labeling (TUNEL) assay.

Results

Data collection and analyses are in progress.

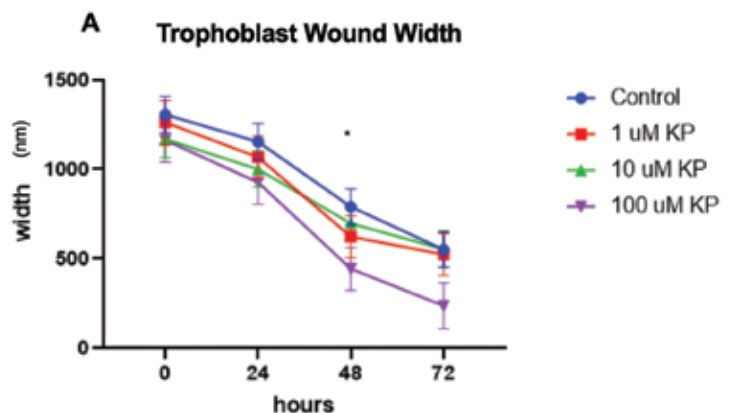
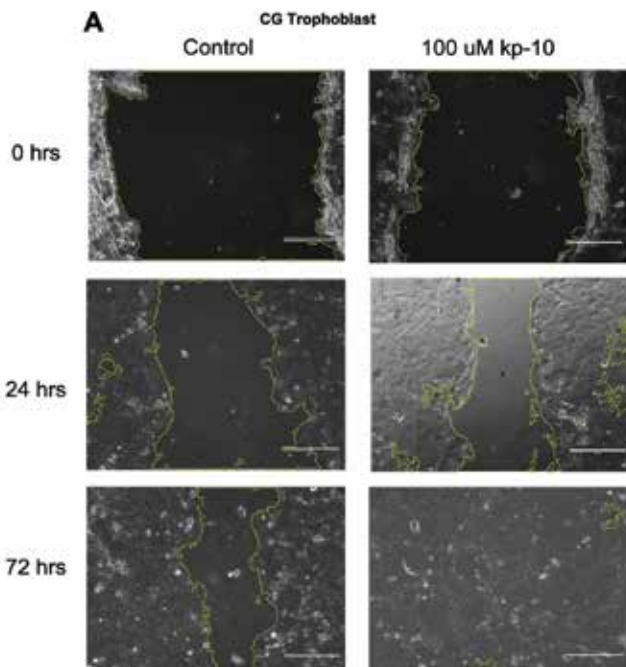
Take Home Message

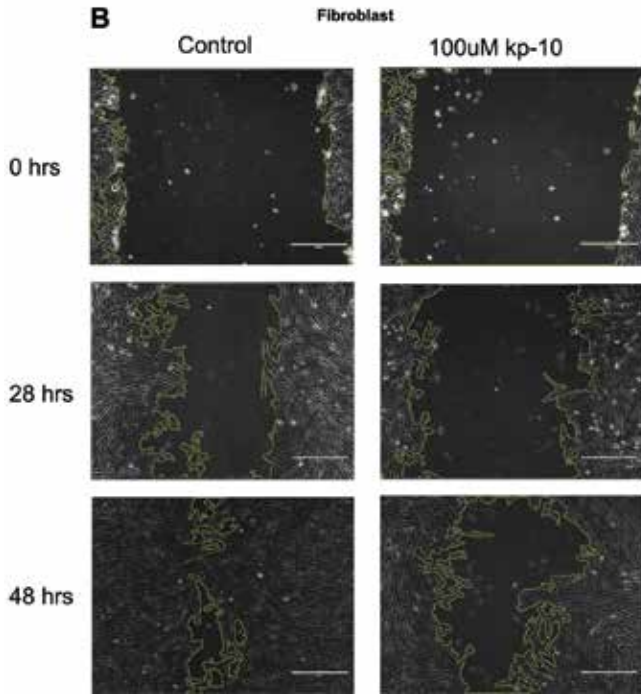
Kisspeptins contribute to regulation of trophoblast cell dynamics in humans and rodents. By investigating a similar role of KP in equine trophoblast cell dynamics, we aim to further advance the field of equine Theriogenology. We hope that our findings propel the development of evidence-based options to hasten trophoblast cell degeneration and return to cyclicity in mares that experienced endometrial cup retention, increasing, therefore, the profitability of the equine breeding industry.

Comparative Studies

Comparative studies are also in progress to investigate the role of Kisspeptins in poor trophoblast cell migration and placentation in a mouse model of preeclampsia, a hypertensive pregnancy syndrome estimated to cause the death of approximately 63,000 women worldwide annually:

Gomes, V.C.L, Reinjders, D., Sones, J.L. (2020) Dysregulated kisspeptin/receptor expression at the maternal-fetal interface in the preeclamptic-like BPH/5 mouse. *FASEBJ*. Vol. 34, Supplement S1. <https://doi.org/10.1096/fasebj.2020.34.s1.06884>



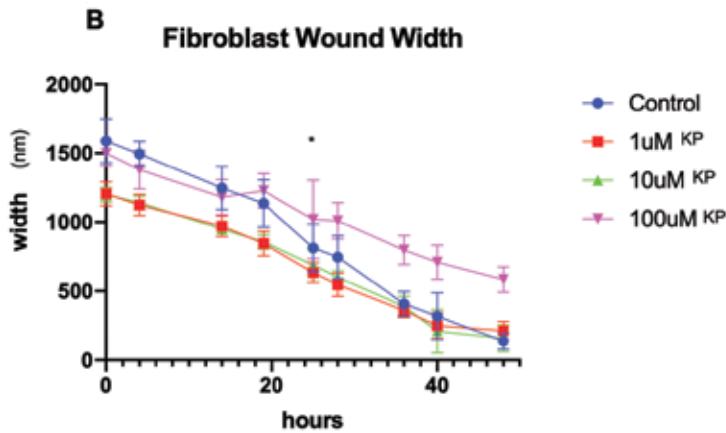


Funding

Louisiana State University Charles V. Cusimano Equine Health Studies Program: Expression of Kisspeptin (kiss1) and Kisspeptin Receptor (kiss1r) by the Invasive Equine Chorionic Girdle Trophoblast Cells and the Endometrial Cups. \$2,500.

Louisiana State University School of Veterinary Medicine VCS Corp Grant: Effects of Kisspeptin-10 on in vitro migration and secretory activity of invasive equine chorionic girdle trophoblast cells. \$4,000.

Theriogenology Foundation Research Grant: Kisspeptins as Pro-apoptotic Mediators during Equine Endometrial Cup Demise. \$5,000.



Analyzing the Effects of Kisspeptin-10 on In Vitro Models of Equine Placental Development

Authors/Investigators

Geels¹, VCL Gomes¹, CC Liu¹, E Oberhaus², JL Sones¹

¹Veterinary Clinical Sciences, School of Veterinary Medicine, Louisiana State University

²Animal Sciences, College of Agriculture, Louisiana State University

Objectives

Adequate trophoblast cell invasion and remodeling of the maternal uterine tissue is a prerequisite for placenta formation and pregnancy success in eutherian mammals, including humans and horses. In vitro models of placentation are utilized to study the complex process of trophoblast cell invasion, migration, and angiogenesis of uterine vasculature. Kisspeptins (KP), a family of small peptides, have been shown to regulate cellular migration and angiogenesis in several cell types, including trophoblast cells. Previous studies demonstrate that KP mRNA (*kiss1*) and *kiss1* receptor (*kiss1r*) expression levels are significantly higher during peak of decidualization (e 7.5) in BPH/5 mice, which genetically exhibit early deficiencies in placental development such as inadequate trophoblast invasion. Therefore, we hypothesized that the invasive equine chorionic girdle trophoblasts and fibroblasts cultured in an enriched KP-10 medium will have decreased cellular migration in a dose-dependent manner.

Experimental Design

Invasive equine chorionic girdle trophoblasts and fibroblast scratch migration assays were performed by having invasive trophoblast cell vesicles or fibroblasts cultured with serum enriched media and 0, 1, 10, or 100 μ M of exogenous KP-10. The cellular monolayer was scratched with a pipette and images were captured at various time points. MRI Wound Healing Tool on Image J was used to determine the width of the scratch by measuring its area and dividing by its length. Data analyses was performed using JMP Pro 15.0.0. A 2-way mixed ANOVA with Tukey post hoc test was used to determine statistical differences between time and treatment. A value of $P < 0.05$ was considered significant.

Results

Data shows that *kiss1* and *kiss1r* are dynamically expressed in the mouse and human placenta. However, there is limited data related to equine. Unlike findings in humans, dose-dependent KP-10 enhances invasive trophoblast cell migration in equine. These findings suggest that KP-10 has a differential function in equine invasive trophoblasts. At the highest concentration of exogenous KP-10 (100 μ M), there is a statistical inhibitory effect on equine fibroblasts. Because the maternal decidua is comprised of fibroblasts, these results demonstrate that KP-10 has different effects on maternal and fetal tissues. Further studies are warranted to investigate the effects of KP-10 on various cells that are critical to maintaining a successful pregnancy in equine. Detection of the embryonic capsule in day 7 equine embryos collected in induced aluteal cycles.

Detection of the embryonic capsule in day 7 equine embryos collected in induced aluteal cycles

Authors/Investigators

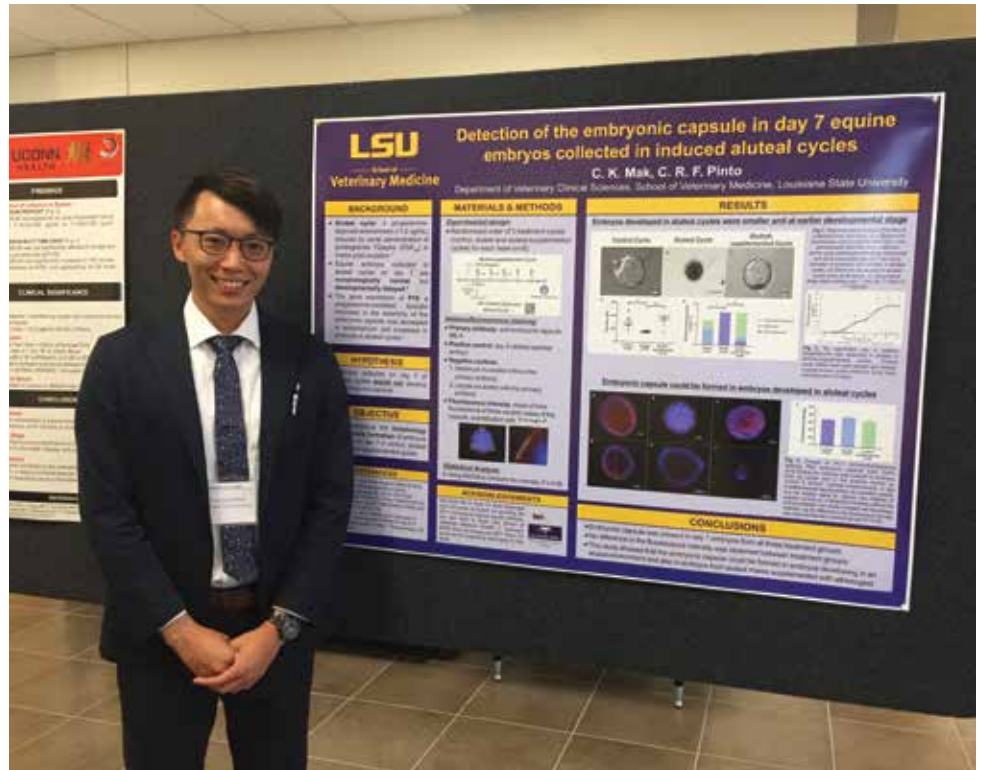
C.K. Mak, C.R.F. Pinto

Department of Veterinary Clinical Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA, USA 70803

Overview

Equine embryos collected on day 7 post ovulation in prostaglandin F_{2α}-induced aluteal cycles (i.e. progesterone-deprived environment; <1.0 ng/mL) have been shown to be morphologically normal but developmentally delayed. We hypothesized that embryos collected on day 7 in aluteal cycles would not develop the embryonic capsule. Eight estrual mares were artificially inseminated, induced to

ovulate with 2,000 IU hCG and then examined twice daily to detect ovulation. Once ovulation was confirmed, mares were allotted to one of three experimental treatments: 1. Control: serial saline solution treatment; 2. Aluteal: serial PGF_{2α} treatment; 3. Aluteal-supplemented: serial PGF_{2α} treatment + a single injection (i.m.) of a long-acting altrenogest solution. Each mare was subjected to all three treatments arranged in a 3-period, 3 treatment crossover design. Day 7 embryos were stained for immunofluorescence using monoclonal anti-capsule antibody, OC-1, as the primary antibody. Negative controls consisted of blastocysts incubated without the primary antibody, and oocytes incubated with the primary antibody. All embryos were evaluated in one session using a fluorescence microscope with identical settings. For each embryo, the total fluorescence of three areas in different, randomly selected regions of the capsule was measured and the mean of these three measurements was recorded. Embryonic capsule was present in day 7 embryos from all three treatment groups. No differences in the fluorescence intensity were observed between treatment groups ($P>0.05$). This study showed that the embryonic capsule could be formed in embryos developing in an aluteal environment and also in embryos from aluteal mares supplemented with altrenogest.



Developmental Potentials of Equine Oocytes in the Breeding and Nonbreeding Seasons

Authors/Investigators

C.K. Mak, C. Leisinger, E. Coffman, V. Medina, M. Markle, D. Paccamonti, C. Pinto

Overview

Department of Veterinary Clinical Sciences, School of Veterinary Medicine, Louisiana State University
Rationale: Limited information is available on the developmental potentials of oocytes collected from mares throughout the year. We hypothesized that oocytes obtained from mares during the nonbreeding season would have developmental potentials similar to oocytes collected during the breeding season.
Methods: Immature cumulus-oocyte-complexes (COCs) were retrieved from ovarian follicles > 5 mm in diameter by transvaginal ultrasound guided aspiration from mares every two weeks between 2016 and 2017. COCs were identified using a stereomicroscope. In vitro production of equine embryos in our laboratory was performed using conventional intracytoplasmic sperm injection and a complete human embryo culture system. Oocyte recovery rate, maturation rate, cleavage rate and blastocyst rate in the breeding and nonbreeding seasons were compared. Data were analyzed using the two-tailed Chi-square test. Statistical significance was set at $P \leq 0.05$.
Results: The oocyte recovery rate in the nonbreeding season was significantly greater than that in the breeding season (51% vs. 39%, respectively). No significant differences were found between nonbreeding and breeding seasons for maturation rate (78% vs. 79%) or cleavage rate (67% vs. 66%). The blastocyst rate in the nonbreeding season was significantly greater than that in the breeding season (20% vs. 9%).
Conclusions: This study provides evidence that oocytes retrieved from mares during different periods of reproductive activity possess adequate developmental competence when subjected to in vitro maturation and fertilization. It remains to be further elucidated why, in the present study, oocyte recovery rate and blastocyst rate were greater in the nonbreeding season than in the breeding season.





DEVELOPMENT

Again, any gift will be special to the LSU School of Veterinary Medicine's Equine Health Studies Program and will make a dramatic and immediate impact on our teaching, service, and scientific investigation programs. We thank you for your generosity and support. To learn more about how your gift will assist the EHSP with its mission, please contact Clayton Forbes, Director of Development, at 225-578-9826 or claytonf@lsu.edu.

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How You Can Support the EHSP and Enhance the Health, Well-Being and Performance of Horses

There are many ways individuals, foundations and companies can help support the LSU School of Veterinary Medicine's Equine Health Studies Program. The EHSP is dedicated to the health, well-being, and performance of horses through veterinary research, education, and service. In order to fulfill our mission of becoming one of the premier equine biomedical centers in the country, we have initiated a plan to generate funds to enhance all aspects of our program.

Professorships and Chairs

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Equine Biomedical Research

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Gifts can be made to the General EHSP Support Fund (a non-endowed account). These funds may be used to purchase equipment for equine scientific investigations. Additionally, they are used for continuing education for the horse-owning public and private equine veterinarians. These funds also are used to assist with other educational, promotional, and fundraising activities.

Equine Farrier Unit (right)

Gifts can be made to the Pfeiffer-Burt Lameness and Farrier Unit. These funds will be used to supplement current funding to provide equipment for diagnosis and treatment of medical and surgical conditions of the equine hoof.

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