2018 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 once again present the 2018 Equine Health Studies Program (EHSP) Equine Research Report, which covers scientific and scholarly activities of the program from 2015 through 2017. 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 new 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 and respiratory disease, 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 repair, 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 emergency preparedness for other veterinary institutions. 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, PhD
Dean, School of Veterinary Medicine, Louisiana State University
Professor, Department of Pathobiological Sciences
The LSU School of Veterinary Medicine continues to promote the highest level of support for equine health and welfare through its commitment to equine research and service. The equine industry is an integral part of the Louisiana livestock community, including the racing and performance, breeding and pleasure industries. Our Equine Health Studies Program is the basis for the research effort that investigates and provides up-to-date and pertinent information for educating students and extending service to the public.

Our faculty continue to participate in quality meaningful research funded through intramural support from the EHSP and extra-mural support from granting institutions and industry. We are much appreciative of 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, Kindred Bioscience, Inc. and other entities that supplied funding for the EHSP research program. The faculty contributing to the EHSP are to be commended for their concerted efforts to ensure that equine health remains one of the top priorities of the LSU SVM.

Sincerely,
Rhonda Cardin, AB, PhD
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 2018 EHSP Research Report from the LSU School of Veterinary Medicine. 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 contributors to the program. The EHSP team continues to produce high quality biomedical research and 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, ground-breaking new treatments, essential techniques in reproduction, and essential information to prevent diseases. Many of the studies in this report were and continue to be presented at local, regional, national and international meetings, including the American Association of Equine Practitioners (AAEP), the American College of Veterinary Surgery (ACVS), the American College of Veterinary Internal Medicine annual forum (ACVIM), the Colic Research Symposium, the Veterinary Orthopedic Society (VOS), the EPM Society, Havemeyer Equine Endocrinology Workshop, the Havemeyer Laminitis Workshop, the Applied Equine Nutrition and Training Conference, the International Equine Infectious Disease Conference, and the 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. The State funding provides researchers with technical support and intramural funds to generate pilot data that leads to extramural funding from the Grayson Jockey Club Research, Morris Animal and the Pennington Biomedical Research Foundations, National Wetlands Research Center, the Bureau of Land Management, and industry partners Boehringer Ingelheim Vetmedica, Elanco Animal Health, SmartPak® Equine, LLC, Zinpro Corporation, Darling Ingredients (Sonac), The High Bush Blueberry Council and Purina Animal Health, among others. Furthermore, we owe our deepest gratitude to the horses that participate in these studies. The research findings presented in this report would not have been possible without the availability and use of 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 Institutional Animal Care and Use Committee (IACUC). These horses are valued members of our program and are treated with kindness and dignity.
The faculty and staff of the EHSP are proud to be a part of this world-class program and look forward to the continued participation in the biomedical research program as it moves forward.

As part of the EHSP team, I am committed to furthering the health, well-being and performance of horses everywhere regardless of the breed or use. Also, with continued support from the horse industry and the State of Louisiana, we can further promote and establish the EHSP at the LSU SVM as the premier equine biomedical program in the southern region and the world.

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

LSU SCHOOL OF VETERINARY MEDICINE
ADMINISTRATION

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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, or Julie Thomas, MMC, public relations coordinator, at jtho279@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.
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 and Director of the Equine Health Studies Program, 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 an 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 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.

Renee T. Carter, DVM (LSU SVM 2000), DACVO, Assistant 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, Assistant 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, PhD, Professor, Pathobiological Sciences

Dr. Chowdhury received his DVM and MS degrees from Bangladesh Agricultural University (Bangladesh) and a PhD 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 recently completed a USDA grant and works closely with industry.
Elizabeth Coffman, DVM, MS, DACT, Instructor of Theriogenology, Veterinary Clinical Sciences

Dr. Coffman received her BS in 2005 and her DVM in 2009, both from the University of Tennessee. She received her MS from the Ohio State University in 2013. Dr. Coffman is a Diplomate of the American College of Theriogenologists. She joined the faculty in 2016. Her research interests include equine reproduction and the uterine environment.

Jeanette 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.

Anderson da Cunha, DVM, MS, DACVAA, Associate Professor of Anesthesiology, Veterinary Clinical Sciences

Dr. da Cunha is Associate Professor and chief of the anesthesiology service for the Veterinary Teaching Hospital. He received his DVM from Federal University of Parana in 2000 and his MS from Federal University of Santa Maria (Brazil) in 2002. He completed his residency in anesthesiology at North Carolina State University in 2006, and he is a Diplomate of the American College of Veterinary Anesthesia and Analgesia.

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

Dr. De Caro Carella 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.

Levant Dirikolu, PhD, 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 PhD, both from the University of Kentucky in 2001. He completed a post-doctoral fellowship in veterinary pharmacology from the University of Kentucky in 2002.

Susan C. Eades, DVM (LSU SVM 1982), PhD, DACVIM, Professor of Equine Medicine, Veterinary Clinical Sciences

Dr. Eades received her DVM in 1982 from the LSU SVM and then completed an internship in large animal medicine and surgery and a residency in large animal internal medicine at the University of Pennsylvania’s New Bolton Center. She then completed a PhD in veterinary physiology at the University of Georgia. Her doctoral studies concentrated on intestinal vascular and nonvascular smooth muscle physiology and pharmacology. Upon completion of her PhD, Dr. Eades began as an assistant professor of large animal medicine at the University of Georgia College of Veterinary Medicine, where she remained through 1997. She returned to LSU in 1998 as an associate professor of equine medicine. Dr. Eades’ clinical interests include equine internal medicine; however, she has a special interest in cardiology and ultrasound. Her research interests include intestinal disease and laminitis. Dr. Eades is currently Department Head of Veterinary Clinical Sciences at Texas A&M University, College of Veterinary Medicine, College Station, Texas.
Bruce E. Eilts, Professor Emeritus of Theriogenology, Veterinary Clinical Sciences

Dr. Eilts is originally from the Minneapolis/St. Paul area in Minnesota. He attended the University of Minnesota as a pre-veterinary medicine student and obtained a BS in veterinary science in 1975 and his DVM in 1977, both from the University of Minnesota. He was in private practice for one year before returning to the University of Minnesota to obtain an MS in theriogenology in 1982. After two and a half years in a private practice in southern California, he came to the LSU SVM as an assistant professor in 1984. He became board certified in the American College of Theriogenologists in 1986, and his main clinical and research interests are in basic reproduction management in the horse.

Jon Fletcher, DVM (LSU SVM 2005), DACVIM, Assistant Professor of Companion Animal Medicine, Veterinary Clinical Sciences

Dr. Fletcher received his DVM from the LSU SVM in 2005. He completed a small animal medicine and surgery rotating internship at Auburn University before returning to LSU for his small animal internal medicine residency, which he completed in 2008. He started an internal medicine practice in a private specialty hospital, where he remained for four years before returning to the LSU SVM to join the faculty in 2012. Dr. Fletcher’s clinical interests include canine and feline endocrinology. He is the section head of the Veterinary Endocrinology Laboratory and his research interests include diabetes mellitus, obesity and endocrine diagnostic techniques.

Joseph Francis, BVSc, MVSc, PhD, Professor, Comparative Biomedical Sciences

Dr. Francis is 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 PhD 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-angiotensin-aldosterone system, in heart failure. He’s also conducting research on the benefits of blueberries and the effects of exercise.

Lorrie Gaschen, DVM, PhD, DECVDI, 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 PhD 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.

Samithamby Jeyaseelan, DVM, PhD, Professor, Pathobiological Sciences

Dr. Jeyaseelan received his DVM degree from the University of Peradeniya (Sri Lanka) in 1992. He received his PhD 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 Lung Biology Laboratory. His research focuses on investigating the mechanisms underlying lung inflammation and host defense in response to bacterial pathogens. Dr. Jeyaseelan has published more than 40 original articles and more than 12 review articles. He serves as an associate editor of the Journal of Immunology, academic editor of PLoS One and serves on the editorial boards of Clinical and Vaccine Immunology and Infection and Immunity. Dr. Jeyaseelan’s research is funded by the National Institutes of Health and Flight Attendant Medical Research Institute.

Jill R. Johnson, DVM, MS, DACVIM, DABVP, Professor Emeritus of Equine Medicine, Veterinary Clinical Sciences

Dr. Johnson is a native of South Dakota and received her DVM from the University of Minnesota, where she also received her MS degree in veterinary surgery and radiology. She joined the faculty of the LSU SVM in 1977. She is a Diplomate in both the American College of Veterinary Internal Medicine and the American Board of Veterinary Practitioners (Equine Practice). Her past research activities have centered on immunogenetics and immunology, methods of quantifying exercise training using the global positioning system (GPS) and development of tissue culture models to study diseases. Her current research involves the spatial-temporal study of hospital-acquired infections in the large animal hospital.

Ronald Koh, DVM, MS, Certified Acupuncture (CVA) and Canine Rehabilitation (CCRP), Assistant Professor, Veterinary Clinical Sciences

Dr. Koh received his DVM degree in 2006 from National Chung Hsing University College of Veterinary Medicine in Taiwan. He completed a specialty internship in acupuncture in 2010 and received his Master’s degree in 2012 from University of Florida College of Veterinary Medicine. Dr. Koh also gained certifications in acupuncture (CVA), Chinese herbal medicine (CVCH), and food therapy (CVFT) through the Chi Institute, as well as Canine Rehabilitation (CCRP) through University of Tennessee College of Veterinary Medicine. His clinical interests include TCVM and integrative medicine for pain management, neurological disorders, geriatric conditions, and palliative and hospice care. Currently, Dr. Koh is an assistant professor and the section chief of the Integrative Medicine Service at the Louisiana State University School of Veterinary Medicine. He has authored several articles on acupuncture, rehabilitation and integrative medicine for publications in the United States and China. He has also been invited to provide lectures and trainings on traditional Chinese veterinary medicine, integrative medicine and rehabilitation for veterinary schools, conferences, and general public events in the United States, China, Russia, and Indonesia. Teaching interests include Integrative Medicine, Acupuncture, Rehabilitation, Nutraceuticals, and Herbal Medicine. Research interests include acupuncture and physical therapy for pain management, spinal injury, and post-surgery.

Britta Leise, DVM (LSU SVM 2002), MS, PhD, DACVS, Assistant 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 PhD 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.
Mandi J. Lopez, DVM, MS, PhD, DACVS, Professor, Veterinary Clinical Sciences

From the Pacific Northwest, Dr. Lopez received her BS from Humboldt State University in Arcata, Calif., and received 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 PhD degrees. She then did a post-doctoral fellowship in applied biomechanics. Her areas of interest are comparative orthopedic research and surgery. Dr. Lopez is a Diplomate of the American College of Veterinary Surgeons and holds several patents for biomedical devices and has expertise in both applied and basic research. 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).

Rebecca S. McConnico, DVM (LSU SVM 1987), PhD, DACVIM, Professor of Equine Medicine, Veterinary Clinical Sciences

Dr. McConnico is originally from north central Ohio but received her DVM in 1987 from the LSU SVM. She received her PhD from and completed a clinical residency in large animal internal medicine at North Carolina State University. She is a Diplomate of the American College of Veterinary Internal Medicine. Dr. McConnico’s clinical interests include equine critical care and internal medicine. She is also a certified veterinary acupuncturist. The long term goals of Dr. McConnico’s research collaborations are elucidating the pathophysiologic mechanisms associated with intestinal diseases in horses and determining the link between these diseases and other related abnormalities (e.g., laminitis, endotoxemia, myositis), with the broader intention of preventing, attenuating and determining effective treatment modalities for these life-threatening conditions. Additionally, Dr. McConnico is integrally involved in the development of the LSU SVM’s disaster preparedness and response program, which provides training and disaster response in partnership with other LSU units, non-government groups, and state and federal government entities. Dr. McConnico is currently Professor of Animal Science at Louisiana Technical University in Rustin, La.

Mustajab Mirza, DVM, MS, DACVS, Assistant 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, Associate 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, where he is 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 collaborates in reproductive research in other domestic species. He shares responsibility for clinical theriogenology cases in all species presented to the LSU Veterinary Teaching Hospital.

Daniel B. Paulsen, DVM, MS, PhD, 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 PhD 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, PhD, DACT, Associate Professor of Theriogenology, Veterinary Clinical Sciences

Dr. Pinto received his DVM from Sao Paulo State University (Brazil) in 1986 and his PhD 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 artificial insemination and in vitro fertilization.

Cherie Pucheu-Haston, DVM (LSU SVM 1992), PhD, 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 PhD 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 research interests include identification of factors involved in the development and perpetuation of atopic dermatitis, the relationships between allergic skin diseases and hypersensitivity in other organ systems (asthma, gastrointestinal disease) and the identification of genomic or proteomic biomarkers of allergic sensitization.
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, PhD, 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 PhD 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), PhD, 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 PhD 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.

Changaram S. Venugopal, BVSc, MSc, MS, PhD, Professor Emeritus, Veterinary Clinical Sciences

Dr. Venugopal received his BVSc from Kerala Veterinary College and Research Institute at Kerala University (India). After practicing veterinary medicine at the Kamadhenu Dairy Farm for five years, he pursued advanced studies and received his MSc
in neuropharmacology from Calicut University (India). He later received his MS degree in cardiovascular pharmacology and a PhD in pulmonary pharmacology from the Massachusetts College of Pharmacy and Allied Health Sciences in a cooperative program with Harvard University in Boston, Mass. Then he worked as a post-doctoral fellow at Harvard Medical School and, in 1981, joined the faculty at the LSU SVM. He received the New Investigator Award grant from the National Institutes of Health in 1983 and the Beecham Award for Research Excellence in 1985. He received the Faculty Distinguished Scholar Award in 2003 from the LSU SVM and the Distinguished Alumni Award from his alma mater in 2005. His research interests include recurrent airway obstruction in horses, mediators of airway hyperreactivity, pathophysiology of insulin resistance in equine laminitis, pharmacology of vasculature, and oxidative stress in equine respiratory diseases. He is the recipient of research grants as principal investigator from the National Institutes of Health, the USDA and the Grayson Jockey Research Foundation, as well as grants from the National Institute of Environmental Health Science and the Louisiana Board of Regents as co-principal investigator. In the area of teaching, Dr. Venugopal has been on the honor roll in merit teaching from 1994-99, and he received an LSU School of Veterinary Medicine Teaching Award in 2008.

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.

Michelle Woodward, DVM, MS (LSU SVM 2014), DACVD, Assistant Professor of Veterinary Dermatology, Veterinary Clinical Sciences

Dr. Woodward joined the faculty in March 2016. She received her BS from the Rose-Hulman Institute of Technology in 2005 and her DVM from the University of Tennessee in 2009. She received her MS in 2014 from the LSU School of Veterinary Medicine, where she also completed her residency in veterinary dermatology. Dr. Woodward is a Diplomate of the American College of Veterinary Dermatology. Her research interests include equine hypersensitivity/allergy and bacterial resistance in the clinical setting.

Advanced equine lameness diagnosis

Advanced imaging (MRI, CT, ultrasonography, radiographs, nuclear scintigraphy, dynamic ultrasound)

Performance evaluation

Podiatry and advanced therapeutic farrier service

Integrative medicine service (shock wave, acupuncture, therapeutic and service massage)

Full-service veterinary hospital
David Beehan, MVB, PhD, DACT

David Paul Beehan, MVB, MS, DipACT (Athgarvan, Newbridge, Ireland), received his PhD in December 2016 from the Department of Veterinary Clinical Sciences (VCS). Dr. Beehan’s dissertation was entitled, “The Investigation of Biofilm Formation by Equine Reproductive Tract Escherichia Coli,” and his major advisor was Sara Lyle, DVM, PhD, DACT, adjunct assistant professor in VCS. Since completing his dissertation, Dr. Beehan has returned to Ireland, where he has taken a position as a veterinarian with the Irish Department of Agriculture. He currently works at the central office in Dublin for a section responsible for infectious disease.

Wei Duan, MS, PhD

Wei Duan, PhD, received his PhD degree from the LSU School of Veterinary Medicine in August 2017. He was part of the Laboratory for Equine and Comparative Orthopedic Research and worked with Mandi Lopez, DVM, PhD, DACVS, director of LECOR. Dr. Duan’s experience includes four years of biomaterials and human stem cell research and four years of canine, equine, and feline adipose derived stem cells research and bioreactor designing. The majority of his research work is within the field of biomaterials and tissue regeneration, specifically equine bone and feline diabetes mellitus. Dr. Duan is currently working on the regenerative medicine in feline diabetes.

Nicole Marie Hanson, BA, BS, PhD, Certificate in Prosthetics

Nicole Marie Hanson, BA, BS, Certificate in Prosthetics (Grafton, Wis.), received her PhD in December 2016 from VCS. Dr. Hanson’s dissertation was entitled, “Evaluation and Biomechanical Analysis of Equine Prosthetics,” and her major advisor was Laura Riggs, DVM, PhD, DACVS, associate professor of equine surgery VCS. Upon graduation, Dr. Hanson plans to continue operating her business, Bayou Time Babysitting and Nannies, and hopes to start a charitable foundation and educate the community about veterinary prosthetics.

Heather Richbourg, PhD

Heather A. Richbourg, PhD, received her BS from Young Harris College in 2013 and her PhD from the LSU School of Veterinary Medicine in 2017. Her mentor was Margaret McNulty, PhD, [then] assistant professor in Comparative Biomedical Sciences. Dr. Richbourg’s dissertation is entitled “Microscopic Evaluations of Bone in Equine and Mucoid Models.”

Michelle Woodward, BS, DVM, DACVD

Michelle Woodward, BS, DVM (Bloomington, Ill.) received her MS in May 2014 from VCS. Her thesis was entitled, “Characterization of IgE-Mediated Cutaneous Immediate and Late-phase Reactions in Non-allergic Horses,” and her major advisor was Frank Andrews, DVM, DACVIM, director of the equine health studies program and professor of veterinary medicine. Dr. Woodward is currently an assistant professor of veterinary dermatology at the LSU SVM.
**PUBLICATIONS**

**TEXTBOOK CHAPTERS**


**Proceedings**


Woodward, M. (2016). Optimizing Your Skin Biopsy. Louisiana State University Dermatology Continuing Education Seminar Series (pp. 3). Baton Rouge, Louisiana, Louisiana State University SVM.

Woodward, M. (2016). Topical Therapy with a Focus on Topical Therapy for Bacterial Skin Disease. Louisiana State University Dermatology Continuing Education Seminar Series (pp. 5). Baton Rouge, Louisiana, Louisiana State University SVM.

Lay Publications


**Continuing Education Presentations**

**International**


Koh, R. (Presenter), Grand Rounds Seminar, “Improving Neurologic and Orthopedic Outcomes with Rehabilitation,” National Taiwan University College of Veterinary Medicine, Taipei City, Taiwan. (September 6, 2016).

Koh, R. (Presenter), Grand Rounds Seminar, “Improving Neurologic and Orthopedic Outcomes with Rehabilitation,” National Chung Hsing University College of Veterinary Medicine, Taichung City, Taiwan. (September 2, 2016).

Koh, R. (Presenter), Hongkong Veterinary Seminar, “Rehabilitation for Intervertebral Disc Disease,” Hongkong Veterinary Medical Association, Hongkong, China. (May 24, 2016).

Koh, R. (Presenter), Hongkong Veterinary Seminar, “Traditional Chinese Veterinary Medicine for Intervertebral Disc Disease,” Hongkong Veterinary Medical Association, Hongkong, China. (May 24, 2016).

Koh, R. (Presenter), Moscow Veterinary Congress, “Intro to Traditional Chinese Veterinary Medicine,” Moscow Veterinary Medical Association, Moscow, Russia. (April 24, 2016).
Koh, R. (Presenter), Moscow Veterinary Congress, “Most Researched Acupoints and their Clinical Applications,” Moscow Veterinary Medical Association, Moscow, Russia. (April 24, 2016).

Koh, R. (Presenter), Moscow Veterinary Congress, “The Science behind Veterinary Acupuncture,” Moscow Veterinary Medical Association, Moscow, Russia. (April 24, 2016).

Koh, R. (Presenter), Moscow Veterinary Congress, “Understanding Acupuncture and How It Could Benefit Your Patients,” Moscow Veterinary Medical Association, Moscow, Russia. (April 24, 2016).


Paccamonti, D. L., Corso de Diplomado en Reproduccion en Equinos, (Diagnostic Techniques for Mare Infertility: How Times Have Changed) AMMVEE, Guadalajara, Mexico. (March 2015).


National


Leise, B. (Author & Presenter), Miller, N., Moorman, V., Bass, L., Pittman, S., Rucker, A., Redden, R., AAEP 62nd Annual Convention,


McConnico, R. S., Equine Medicine 911. Western Veterinary Conference, Las Vegas, NV. (February 16, 2015).

McConnico, R. S., Horse Hot Zone: Care and Management of Equine Infectious Disease Cases. Western Veterinary Conference. Las Vegas, NV. (February 2015).

McConnico, R. S., Preventing Pestilence. Western Veterinary Conference. Las Vegas, NV. (February 16, 2015).

McConnico, R. S., The Veterinarian's Role in Cases of Equine Cruelty. Western Veterinary Conference. Las Vegas, NV. (February 16, 2015).


Mirza, M. H., Large Animal Rescue Techniques. LDAF. (September 2015).


Welborn, M. G. (Presenter), Update on Zoonotic Diseases. Southwest Veterinary Symposium. Ft. Worth, TX. (September 26, 2015).

**State and Local**


Andrews, F. M. (Author & Presenter), Equine Cushing Disease: No your Father’s Wooly Mammoth! Midwest Veterinary Conference. Columbus, Ohio. (February 2015).

Andrews, F. M. (Author & Presenter), Gastric Ulcers: A pain in the Gut! Midwest Veterinary Conference. Columbus, Ohio. (February 2015).

Andrews, F. M. (Author & Presenter), Gastric Ulcers: Relieving the Pain! Midwest Veterinary Conference. Columbus, Ohio. (February 2015).


De Caro Carella, C., Continuing Education for Technicians, “Moving Into the Future with the Digital Anesthetic Record,” Louisiana State University SVM, Baton Rouge, Louisiana. (December 5, 2016).


Pucheu-Haston, C. M., Therapeutics for Skin Disease in the Horse. Louisiana Veterinary Medical Association Equine Seminar 2015. Louisiana Veterinary Medical Association, Shreveport, Louisiana. (September 2015).


Other Educational Contributions

Interviews


Annotations


Refereed Publications


doi/10.1111/eve.12621/epdf


Scientific Abstracts

Oral Presentations


Andrews, F. M. (Author & Presenter), Gastric Ulcers: Relieving the pain! Midwest Veterinary Conference. Ohio Veterinary Medical Association, Columbus, Ohio. (February 2015).


Andrews, F. M. (Author & Presenter), BIVI Veterinary Meeting, “Equine Gastric Ulcer Syndrome: Updates on Diagnosis and Treatment,” Boehringer Ingelheim Vetmedica, Bozeman, Montana. (September 8, 2016).

Andrews, F. M. (Author & Presenter), BIVI Veterinary Meeting, “Equine Protozoal Myeloencephalitis: Updates on Diagnosis and Treatment,” Boehringer Ingelheim Vetmedica, Bozeman, Montana. (September 8, 2016).


De Caro Carella, C., Continuing Education for Technicians, “Moving Into the Future with the Digital Anesthetic Record,” Louisiana State University SVM, Baton Rouge, Louisiana. (December 5, 2016).


Eades, S. C., Laminitis Induction Via Carbohydrate Overload and Euglycemic Hyperinsulinemic Clamp Technique and the Effects of Pentoxifylline on Lameness. The Ohio State University Department Seminar. The Ohio State University. (June 2015).


Koh, R., Integrative Medicine - Moving Health Care In A New Direction. South West Veterinary Conference. Fort Worth, Texas. (September 2015).


Koh, R. (Presenter), Hongkong Veterinary Seminar, “Rehabilitation for Intervertebral Disc Disease,” Hongkong Veterinary Medical Association, Hongkong, China. (May 24, 2016).

Koh, R. (Presenter), Hongkong Veterinary Seminar, “Traditional Chinese Veterinary Medicine for Intervertebral Disc Disease,” Hongkong Veterinary Medical Association, Hongkong, China. (May 24, 2016).


Koh, R. (Presenter), Grand Rounds Seminar, “Improving Neurologic and Orthopedic Outcomes with Rehabilitation,” National Taiwan University College of Veterinary Medicine, Taipei City, Taiwan. (September 6, 2016).
Koh, R. (Presenter), Grand Rounds Seminar, “Improving Neurologic and Orthopedic Outcomes with Rehabilitation,” National Chung Hsing University College of Veterinary Medicine, Taichung City, Taiwan. (September 2, 2016).

Koh, R. (Presenter), Grand Rounds Seminar, “Improving Neurological Patient Outcomes with Rehabilitation,” China Agricultural University College of Veterinary Medicine, Guangzhou, China. (May 19, 2016).


Koh, R. (Presenter), Moscow Veterinary Congress, “Intro to Traditional Chinese Veterinary Medicine,” Moscow Veterinary Medical Association, Moscow, Russia. (April 24, 2016).

Koh, R. (Presenter), Moscow Veterinary Congress, “Most Researched Acupoints and their clinical applications,” Moscow Veterinary Medical Association, Moscow, Russia. (April 24, 2016).

Koh, R. (Presenter), Moscow Veterinary Congress, “The Science behind Veterinary Acupuncture,” Moscow Veterinary Medical Association, Moscow, Russia. (April 24, 2016).

Koh, R. (Presenter), Moscow Veterinary Congress, “Understanding Acupuncture And How It Could Benefit Your Patients,” Moscow Veterinary Medical Association, Moscow, Russia. (April 24, 2016).


McConnico, R. S., Equine Medicine ‘911’.Western Veterinary Conference. Las Vegas, Nevada. (February 2015).


McConnico, R. S., Horse Hot Zone: Care and Management of Equine Infectious Disease Cases. Western Veterinary Conference. Las Vegas, Nevada. (February 2015).


McConnico, R. S., Preventing Pestilence. Western Veterinary Conference. Las Vegas, Nevada. (February 2015).

McConnico, R. S., The Veterinarian’s Role in Cases of Equine Cruelty. Western Veterinary Conference. Las Vegas, Nevada. (February 2015).


McConnico, R. S. (Author & Presenter), Rashmir, A. (Author & Presenter), 8th World Congress of Veterinary Dermatology, “The Use of Serine Protease Inhibitors in the Treatment of Equine Pemphigus Foliaceus,” World Association of Veterinary Dermatology, Bordeaux, France. (June 3, 2016).


Mirza, M. H., Large Animal Handling and Rope Tying. (September 2015).


Mirza, M. H., Large Animal Rescue Techniques. LDAF. (September 2015).


Sones, J. L. (Author & Presenter), Louisiana Biomedical Collaborative Research Program, “The Role of Maternal Adipose Tissue in the Preeclamptic-Like BPH/5 Mouse,” Louisiana State University, Baton Rouge, Louisiana. (September 2016).


Welborn, M. G. (Presenter), Update on Zoonotic Diseases. Southwest Veterinary Symposium. Ft. Worth, Texas. (September 2015).

Welborn, M. G. (Author & Presenter), Louisiana Cattleman’s Annual Convention, “Toxic Plants to Be Mindful of in the Spring,” Louisiana Cattleman’s Association, Houma, Louisiana. (January 9, 2016).


Poster Presentations


Gillett, A. (Author & Presenter), McNulty, M. A. (Other), Goupil, B. (Other), Mitchell, C. F. (Other), Effects of Tiludronate on Bone Growth and Remodeling in Young Horses. Louisiana State University SVM Phi Zeta Research Day. (September 2015).

Gillett, A. (Author & Presenter), McNulty, M. A. (Other), Goupil, B. (Other), Mitchell, C. F. (Other), Effects of Tiludronate on Bone Growth and Remodeling in Young Horses. Merial/NIH Symposium at UC Davis. California. (August 2015).


Malik, C. (Presenter), Keowan, M. (Other), Fletcher, J. M. (Other), Kearney, M. T. (Other), Chapman, A. M. (Author), Evaluation of Seasonal Change in Adrenocorticotropic Concentrations in Response to Thyrotropin-Releasing Hormone in Aged Ponies. Merial/NIH Veterinary Summer Scholars Conference. Merial/NIH Veterinary Summer Scholars Program. Davis, California. (August 2015).


McNulty, M. A. (Author & Presenter), Gillett, A. (Other), Goupil, B. (Other), Mitchell, C. F. (Other), Orthopaedic Research Society, “Effects of Tiludronate on Bone Growth and Remodelling in Young Horses,” Orlando, Florida. (March 5, 2016).


Published Abstracts


Funded Proposals


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 1, 2016 - July 1, 2017).


Chapman, Ann M (PI), “Evaluation of α-melanocyte-stimulating hormone and proopiomelanocortin responses to thyrotropin releasing hormone in young and aged ponies,” Sponsored by EHSP Corp Fund, Louisiana State University, $12,000. (September 4, 2015 - Present).

Davoll, Gabriel A (PI), Pinto, Carlos R, Paccamonti, Dale L., “A. Title: Antiluteogenic Treatment of Hemorrhagic Anovulatory Follicles,” Sponsored by Charles V. Cusimano EHSP grant, Louisiana State University, $6,000. (August 15, 2016 - June 30, 2017).


Eades, Susan C (PI), Fugler, Lee Ann, “Effects of Pentoxifylline on Cytokine Production in Carbohydrate Overload Laminitis,” Sponsored by Departmental Research, Louisiana State University, $5,000. (May 2015 - Present).

Eades, Susan C (PI), Riggs, Laura M, Fugler, Lee Ann, Sandow, Cole, “Ex vivo equine digital laminar explant integrity and phosphorylation events in response to high concentrations of insulin,” Sponsored by EHSP Grants Program, State, $12,000. (September 1, 2015 - Present).


Geautraux, Sarah (PI), Koch, Catherine, Bruns, Susan, McConnico, Rebecca S, “Acupuncture Treatment and the Attenuation of Salivary Cortisol Levels in the Domestic Horse,” Sponsored by Merida/NIH Veterinary Summer Scholars Program Summer Biomedical Research Opportunities for Veterinary Students, Louisiana State University, $5,500. (May 15, 2015 - August 15, 2015).

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 - Present).


Lopez, Mandi J (PI), Duan, Wei, “Selecting adipose-derived stromal cells for osteogenesis with fluorescence-activated cell sorting,” Sponsored by LSU School of Veterinary Medicine Equine Health Studies Program, Local, $12,000. (September 1, 2015 - Present).


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 Louisiana State University Equine Health Studies Program, Local, $8,000. (September 2016 - June 2017).


Lopez, Mandi J (PI), Kraus, Peter, “A Revolutionary Mechanism to Support CuttingEdge Discoveries to Prevent and Treat Degenerative Hip Disease,” Sponsored by LSU-Health Sciences Center, State, $8,000. (July 1, 2016 - June 30, 2017).


Markle, Mariah (PI), Pinto, Carlos R, “Effects of Systemic Serial Administration of Prostaglandin F2 Alpha (PGF2α) on the Early Developing Corpus Luteum of Mares,” Sponsored by Charles V. Cusimano EHSP grant, Louisiana State University, $6,000. (August 15, 2016 - June 30, 2017)

McConnico, Rebecca S (PI), Mirza, Mustajab H, “Northwestern State University Disaster Response Training for Technician Students,” Sponsored by Louisiana State Animal Response Team (Walter J. Ernst Jr. Foundation of the LVMA), State, $4,000. (March 1, 2015 - June 1, 2015).


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 2, 2016 - September 1, 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 1, 2015 - Present).


Richbourg, Heather, Lopez, Mandi J (PI), Schachner, Emma, “Shoe shape affects motion of the distal phalanx in normal and laminitic hooves,” Sponsored by LSU School of Veterinary Medicine Equine Health Studies Program, $6,000. (September 1, 2015 - Present).


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, $4,000. (October 10, 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 24, 2016 - Present).

Sones, Jennifer L (PI), Redman, Leanne M, “The Role of Maternal Adipose Tissue in the Preeclamptic-Like BPH/5 Mouse,” Sponsored by Louisiana Biomedical Collaborative Research Program, Louisiana State University, $50,000. (September 22, 2016 - Present).


Witonsky, Sharon (PI), Andrews, Frank M, Del Piero, Fabio, Keowen, Michael L, Garza, Jr., Frank, “Equine Protozoal Myeloencephalitis (EPM): Identifying the immune response and the role of infection,” Sponsored by Virginia Maryland Regional College of Veterinary Medicine Internal Grant, Other, $19,998. (July 1, 2015 - July 1, 2016).

Pending Proposals


Active Grants in 2015

Baia, Petrisor (PI), Riggs, Laura M, Riggs, Laura M, “Histomorphometric and Surface Topography Analysis of Stainless Steel Implants with Different Surface Treatment,” Sponsored by Charles V. Cusimano EHSP. Louisiana State University. $8,000. (August 2012 - Present).


Burba, Daniel J, Andrews, Frank M, “Prevalence of Gastric Ulcers in Horses that Crib Bite - Clinical Study,” Sponsored by EHSP. Louisiana State University. $5,000. (October 2012 - Present).


Mitchell, Colin F (PI), McNulty, Margaret A, “Influence of Tiludronate on Bone Density and Bone Formation in Young Horses,” Sponsored by Equine Health Studies Program. Louisiana State University. $9,500. (September 1, 2014 - July 1, 2015).


Richbourg, Heather, Lopez, Mandi J (PI), “Shoe Shape Affects Motion of the Distal Phalanx (P3) in Normal and Laminitic Equine Hooves: Three Dimensional Models of P3 Motion Within the Hoof,” Sponsored by Veterinary Clinical Sciences Corp. Local. $2,000. (September 2014 - June 30, 2015).

Riggs, Laura M, Hansen, Nicole M., “Are Implanted Prosthetic Legs for Horses Possible.” Sponsored by Experiment.com crowd funding. Private, $10,000. (November 15, 2014 - Present).


**Active Grants in 2016**

Baia, Petrisor (PI), Riggs, Laura M, Riggs, Laura M, "Histomorphometric and Surface Topography Analysis of Stainless Steel Implants with Different Surface Treatment," Sponsored by Charles V. Cusimano EHSP, Louisiana State University, $8,000. (August 2012 - Present).

Beehan, David (PI), Lyle, Sara K, "Detection of Uropathogenic Virulence Genes in Equine Reproductive Tract Escherichia Coli by Polymerase Chain Reaction and Comparing Results with Isolate Biofilm Forming Potential," Sponsored by Department of Veterinary Clinical Science, Louisiana State University, $1,710. (October 2014 - Present).


Eades, Susan C (PI), Riggs, Laura M, Fugler, Lee Ann, Sandow, Cole, “Ex Vivo Equine Digital Laminar Explant Integrity and Phosphorylation Events in Response to High Concentrations of Insulin," Sponsored by EHSP Grants Program, State, $12,000. (September 1, 2015 - Present).


Lopez, Mandi J (PI), Duan, Wei, “Selecting Adipose-Derived Stromal Cells for Osteogenesis with Fluorescence-Activated Cell Sorting,” Sponsored by Louisiana State University SVM Equine Health Studies Program, Local, $12,000. (September 1, 2015 - June 30, 2016).


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 1, 2015 - Present).


Richbourg, Heather, Lopez, Mandi J (PI), Schachner, Emma, "Shoe Shape Affects Motion of the Distal Phalanx in Normal and Laminitic Hooves," Sponsored by LSU School of Veterinary Medicine Equine Health Studies Program, $6,000. (September 1, 2015 - June 30, 2016).


AWARDS

Armstrong, Chance L.
Lee County Cattlemen’s Association Presidents Award, Lee County Cattlemen’s Association. (January 28, 2015).

Chapman, Ann M.
Dean’s Teacher Merit Honor Roll, Louisiana State University, School of Veterinary Medicine. (May 2015).
Dean’s Teacher Merit Honor Roll, Louisiana State University SVM. (April 29, 2016).

da Cunha, Anderson F.
10 Years Service Award, Louisiana State University. (July 1, 2015).
Dean’s Teacher Merit Honor Role, School of Veterinary Medicine. (May 2, 2015).
Dean’s Teacher Merit Honor Roll, Louisiana State University SVM. (April 29, 2016).

De Caro Carella, Chiara
The Honor Society of Phi Kappa Phi Initiation. (February 16, 2016).

Eades, Susan
Dean’s Teacher Merit Honor Roll, Louisiana State University SVM. (May 2015).
Paula and Milton Shepard Professorship. (July 1, 2015).

Fletcher, Jon
Dean’s Teacher Merit Honor Role, LSU School of Veterinary Medicine. (May 2015).

Gaschen, Lorrie
Dean’s Teacher Merit Honor Role (Year I), LSU School of Veterinary Medicine. (December 2015).
Dean’s Teacher Merit Honor Roll Year 3, Louisiana State University SVM. (December 20, 2016).

Granger, L. Abbigail
Dean’s Teacher Merit Honor Role (Year I), LSU School of Veterinary Medicine. (2015).
Dean’s Teacher Merit Honor Role (Year II, LSU School of Veterinary Medicine. (2015).
Phi Kappa Phi non-tenured faculty award, LSU Alumni Association & the LSU chapter of the Honor Society of Phi Kappa Phi. (March 31, 2016).

Leise, Britta
Dean’s Teacher Merit Honor Roll, Louisiana State University SVM. (April 2016).
Lopez, Mandi J.

Fellows Program Nomination, National Academy of Inventors. (October 2015).

First Place (PhD Student Competition), Phi Zeta Research Emphasis Day Poster Competition, Tau Chapter, Phi Zeta. (September 30, 2015).


National Academy of Inventors Fellow, National Academy of Inventors. (December 2016).


McConnico, Rebecca S.

Dean’s Teacher Merit Honor Role, LSU School of Veterinary Medicine. (2015).

Dean’s Teacher Merit Honor Roll, Louisiana State University SVM. (May 15, 2016).

Mitchell, Colin F.

Dean’s Teacher Merit Honor Roll, Louisiana State University SVM. (May 2016).

Mirza, Mustajab H.

Dean’s Teacher Merit Honor Role, LSU School of Veterinary Medicine. (2015).

Paccamonti, Dale Lee

Dean’s Teacher Merit Honor Roll, Louisiana State University SVM. (2016).

Pucheu-Haston, Cherie M.

Dean’s Teacher Merit Honor Roll, LSU SVM. (May 1, 2015).

Master of Ceremonies, 2015 SVM Awards and Honors Ceremony. (May 1, 2015).

Rising Faculty Research Award 2015, LSU Alumni Association. (May 5, 2015).

Dean’s Teacher Merit Honor Roll, Louisiana State University SVM. (April 29, 2016).


Zoetis Award for Veterinary Research Excellence, Zoetis. (March 16, 2016).

Rademacher, Nathalie

Dean’s Teacher Merit Honor Roll, LSU Year I students. (May 1, 2015).

Summer Research Award, Merck Merial Research Scholar Program. (March 2015).
HONORS AND AWARDS

Dean’s Teacher Merit Honor Roll, LSU Year I and II students, Louisiana State University SVM. (April 29, 2016).

Riggs, Laura M.
Dean’s Teacher Merit Honor Roll, LSU SVM. (May 2015).
Dean’s Teacher Merit Honor Roll, Louisiana State University SVM. (May 2016).

Welborn, Matthew G.
2015 Dean’s Teacher Merit Honor Role, SVM. (May 1, 2015).
2015 Dean’s Teacher Merit Honor Role, SVM. (May 1, 2015).
Dean’s Teacher Merit Honor Roll, Louisiana State University SVM. (April 29, 2016).

Offices Held in Professional Societies

Armstrong, Chance Lee
Lee County Cattlemen’s Board of Directors (January 1, 2014 - January 1, 2017) Alabama Cattlemen’s Association

Paccamonti, Dale Lee
Member, Educational Programs Committee (December 2014 - December 2016), American Association of Equine Practitioners
Member, ACT representative on ABVS Committee (July 2005 - July 2020) American Veterinary Medical Association

Pinto, Carlos Roberto Fontes
Scientific Abstract Review Committee Member (2015 - 2019) American College of Theriogenologists

Rademacher, Nathalie
President (October 24, 2014 - October 2016) Veterinary Ultrasound Society of the American College of Veterinary Radiology
Credential Committee (August 2014 - November 30, 2016) European College of Veterinary Diagnostic Imaging

Editorial Review Boards

Andrews, Frank Michael
Editor, Journal Editor, Equine Veterinary Education, Lexington, Kentucky. (September 1, 2013 - Present).
Gaschen, Lorrie
   Editor, Associate Editor, Veterinary Radiology & Ultrasound. (2007 - Present).

Lopez, Mandi J.
   Editor, Associate Editor, Veterinary Surgery. (2015).
   Editor, Associate Editor, Veterinary Surgery. (2016).

Pinto, Carlos Roberto Fontes
   Editor, Associate Editor, Journal of Small Animal Practice, Oxford. (July 1, 2008 - Present).

Pucheu-Haston, Cherie M.

Riggs, Laura M.
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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’s chambers systems and multiple tissue baths for measuring gastrointestinal mucosal permeability and injury and muscular contraction.

Ussing’s chambers for gastrointestinal permeability studies
Laminitis Research Laboratory

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.
Lameness examination in the Pfeiffer-Burt Lameness and Performance Pavilion with force platform for objective measurement of lameness

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

Lameness Locator

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
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 laminar cells for use as an in vitro model of laminitis and bone marrow stem cells for use in tendon healing.

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.
FACILITIES AND EQUIPMENT

**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.

**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 has also added new 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. Laparoscopy is available and used for oviductal insemination and for minimally invasive placement of intrauterine catheters. We maintain a close collaborative relationship with the Equine Biotechnology Laboratory, which is part of the LSU Agricultural Center. This facility has tissue culture laboratories and micromanipulators that make possible such advanced assisted reproductive techniques as intracytoplasmic spermatozoal injection and nuclear transfer (cloning).

**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.
Assessment of Digital Venograms in Non-Laminitic Horses

Authors/Investigators
Britta Leise, DVM, PhD, DACVS, Nigel Miller, DVM, Valerie Moorman, DVM, PhD, DACVS, Luke Bass, DVM, MS, DAVBP, Sammy Pittman, DVM, Amy Rucker, DVM, R.F. Redden, DVM

Date Issued
Presented in 2016 at the AAEP Annual Convention; Orlando, FL.

Introduction
Venography is frequently used to assess vascular perfusion in the hoof; however, interpretation of the venogram remains subjective and can be challenging to veterinarians with limited experience performing venography.

Objective
The purpose of this study was to evaluate venographic technique in athletic, non-laminitic horses and to describe variations in the pattern.

Methods
- Horses were evaluated for lameness, and survey radiographs were obtained for each foot. Survey radiographs were evaluated for bone and hoof angle, palmar angle and sole depth.

- Venograms were performed in both front feet of 23 horses. The amount of contrast and time required for infusion was recorded for each foot. Venograms were graded for contrast distribution throughout the digital vasculature.

- A total of 45 venograms in 23 horses were successfully performed.

- Amount of contrast infused in each foot averaged 22.9 mls.

- All venographic images were obtained within an average of 97 seconds post-infusion.

Results
- Fourteen feet had decrease contrast in the dorsal lamellar vessels on the early weight-bearing view, but contrast returned to this region when viewed on the unweighted lateral.

- Variation in the venographic pattern can be related to hoof conformation and weight-bearing; however, full assessments can be given if multiple views are obtained.
**Take Home Message**

Digital venography in horses without known digital pathology demonstrates slight variations in the vascular pattern of the equine foot. Obtaining a full series of images, including early and late lateral views and weight-bearing and non-weight bearing images are necessary when assessing the vascular pattern in all horses.

Venogram image obtained immediately post digital venous perfusion with 24 ml of radiographic contrast agent.

**Use of Laser Capture Microdissection for the Assessment of Equine Laminar Basal Epithelial Cell Signaling in the Early Stages of Laminitis**

**Authors/Investigators**
Britta Leise, DVM, PhD, DACVS; Mauria Watts; Sashwati Roy, PhD; Selen Yilmaz; Hansjuerg Alder, PhD; James Belknap, DVM, PhD, DACVS

**Date Issued**
Published in Equine Vet J. (2015) 47:478-488

**Introduction**
The central event leading to structural failure of the lamina in equine laminitis is the detachment of the laminar basal epithelial cell (LBEC) from the basement membrane. As epithelial cell signaling is central to organ dysfunction and failure (i.e., kidneys, lungs) in human sepsis, we hypothesized that LBEC signaling plays a similar role in laminar failure in equine sepsis-related laminitis.
Objective
The objective of this study was to isolate LBECs from laminar tissue using LCM techniques and subsequently identify genes involved in LBEC dysfunction during the early stages of carbohydrate (CHO)-induced laminitis.

Methods
• Laser capture microdissection (LCM) was used to isolate LBECs from cryosections obtained from laminar biopsy samples taken prior to (CON), and 24 (DEV) and 48 h (OG1) following experimental carbohydrate (CHO) overload in eight horses.
• Broad transcriptome analysis (RNA-Seq) was used to identify genes and signaling events occurring in LBECs.
• Forty genes (22 increased/18 decreased) were differentially expressed at the DEV time, and 107 genes (57 increased/50 decreased) were differentially expressed at the OG1 time compared to CON.
• On bioinformatics analysis, the major signaling pathways induced at the two time points were those involved in inflammatory signaling and regulation of extracellular matrix.
• Inflammatory signaling in the LBEC included increased expression of cytokines, monocyte chemokines, Toll-like receptors and multiple enzymes involved in prostanoid synthesis.
• Matrix signaling included upregulation of matrix metalloproteases and decreases in matrix proteins important in maintaining stability at the epidermal/dermal interface in other species, including small leucine rich proteoglycans (biglycan, decorin, lumican, fibromodulin) and collagen XIA1.

Results
The results demonstrate that the LBEC is not just a casualty but an active participant in laminar events leading to structural failure in laminitis.

Laser capture microdissection from equine lamina (hoof tissue). A) section of laminar basal epithelial cell (LBEC) are selected from 10x microscopic images. B) laser is used to cut the selected tissue from the microscope slide. C) cut section is catapulted into an adhesive cap and collected for gene expression analysis.
Optimized Adult Equine Multipotent Stromal Cell Osteogenesis with Customized Scaffolds and Perfusion Bioreactor Culture

Authors/Investigators
Wei Duan, Carmel Fargason, Mandi J. Lopez, Department of Veterinary Clinical Sciences, LSU SVM

Introduction
A tissue engineering approach to restore damaged equine bone represents a promising alternative to current therapeutic strategies. The proposed approach involves selection of adipose derived-multipotent stromal cells (ASCs) that have the best potential for bone generation in combination with a scaffold carrier. The most common method to isolate ASCs from adipose tissue is collagenase digestion. However, collagenase may hydrolyze proteins, leave foreign protein residues and change surface marker expression. The ideal digestion mixture has the lowest collagenase concentration and the highest ASC yield. Additionally, primary ASCs isolates contain numerous subpopulations with distinct behaviors. Specific immunophenotypes may have more predictable clinical behavior. To achieve the best osteogenic outcomes, the ideal scaffold must be identified, and our previous work confirmed poly-l-lactic acid (PLLA) and polyethylene glycol (PEG) support ASC attachment and osteogenic differentiation. Culture conditions should support cell viability while promoting osteogenesis. We sought to design a custom perfusion bioreactor system in which culture medium and cells pass through the internal porous network of scaffold carriers. This culture system mitigates internal diffusion limitations inherent to large tissue constructs.

Objectives
The objectives of this study were to optimize equine ASC isolation and, subsequently, select ASC immunophenotype subpopulations with the best osteogenic capacity. We also planned to enhance decellularized/deproteinized trabecular bone with custom, osteogenic coatings and to design and build a custom perfusion bioreactor system, both for optimal equine ASC osteogenesis. Our ultimate goal is to develop viable bone tissue grafts from individual ASCs.
Methods

The stromal vascular fraction (SVF) was equally divided into two equal portions. Specific cell immunophenotypes were selected from one portion while the entire cell population in the other portion was utilized. Both portions were evaluated up to cell passage 3. Outcomes for both cohorts included cell ultrastructure and surface antigen expression, as well as viability, proliferation and plasticity. To make customized scaffolds, the osteogenic surface coating materials PLLA and PEG at ratio of 60:40 were used to coat deproteinized/decellularized equine trabecular bone scaffolds through physical adsorption. Pore size was maintained at 300µm, a size found to support differentiation and extracellular matrix (ECM) production by undifferentiated cells. Adult equine ASCs were loaded onto coated, deproteinized/decellularized trabecular bone scaffolds using a customized perfusion bioreactor. The cells were counted immediately after loading, and the constructs evaluated after seven, 14 and 21 days of static culture in osteogenic or stromal medium. Constructs were evaluated for cell number, morphology, extracellular matrix deposition, viability, distribution, osteogenic differentiation, osteogenic target gene mRNA levels and protein expression at each time point.

Results

The equine ASC immunophenotype MHCI-, CD44+, and CD105+ shows comparable calcium deposition and lipid droplet formation compared to unsorted cells following seven days of culture in osteogenic and adipogenic induction medium, respectively. The equine ASC immunophenotype has significantly higher osteoblastic and adipocytic colony forming unit frequency percentages than unsorted cells and there is no detectable effect of collagenase type I concentration in the tissue digestion solution. Customized polymer coating materials were distributed throughout the scaffold surface.

![Figure 1. Unsorted, CD44+, CD105+, MHCII+ or MHCII- equine ASCs have similar fibroblastic (CFU-F), osteoblastic (CFU-Ob), and adipogenic (CFU-Ad) differentiation capabilities.](image1)

![Figure 2. The customized polymer coating materials were distributed throughout the deproteinized/decellularized trabecular bone scaffold.](image2)

Take Home Message

There are no differences in cell expansion, plasticity or surface protein expression among ASCs isolated from adipose tissue with different collagenase concentrations. Unsorted cells have significantly higher expansion rates but lower differentiation potential than ASCs that are CD44+, CD105+, and MHCI+ or -. Differences in behavior between sorted and unsorted cells confirm the importance of using specific ASC immunophenotypes for clinical applications to help ensure the most predictable clinical outcomes.
Funding

This study was funded by a Charles V. Cusimano Equine Health Studies Program grant, Equine Health Studies Program (EHSP), Louisiana State University School of Veterinary Medicine. The authors declare no conflicts of interest.

Year Completed

In progress

Isolation and Characterization of Equine Hoof Stem Cells

Authors/Investigators

Qingqiu Yang\textsuperscript{1}, Mandi J Lopez\textsuperscript{1}, Catherine Takawira\textsuperscript{2}

\textsuperscript{1}Laboratory for equine and comparative orthopedic research; \textsuperscript{2}Department of veterinary clinical science, LSU SVM; \textsuperscript{2}Equine health study program, LSU SVM

Introduction

Every year, laminitis results in great expense and loss of equine companions. Our novel area of investigation is the relationship between laminitis and equine hoof stem cells. Specifically, we seek to develop a laboratory model to study the effects of laminitis on equine hoof stem cells and to develop therapies to prevent or treat hoof damage.

Objectives

The purpose of this study is to isolate and characterize stem cells from both unaffected and laminitic hooves, including a transitional stem cell that is unique to the hoof. We hypothesize that the immunophenotypes and expansion rate of equine hoof stem cells are changed during laminitis.

Methods

Hooves were harvested from five horses with laminitis and five horses without laminitis euthanatized for reasons unrelated to this study. Laminar tissue was harvested from hooves, and stem cells were isolated via collagenase digestion.

Cell expansion rate and plasticity were quantified with cell doubling and colony forming unit frequency (CFU) assays, respectively. Quantitative real time PCR, flow cytometry, immunohistochemistry and immunocytochemistry techniques were used for cell immunophenotype identification. Flow cytometry was also used to isolate transitional stem cells with both epidermal and mesodermal markers. The differentiation ability of stem cells, including transitional stem cells, from unaffected and laminitic hooves was quantified with adipogenesis and osteogenesis differentiation assays. Cell ultrastructure was evaluated with transmission electron microscopy (TEM).
Results

Cell morphology and expansion rates are similar between stem cells from unaffected and laminitic hooves. Stem cells from both unaffected and laminitic hooves express CD29, CD105, CD44, and K15, which is also expressed by cells in situ. Transitional stem cells are also present in unaffected and laminitic hoof tissue.

Transitional stem cells show better adipogenic and osteogenic differentiation than unsorted cells. Elongated mitochondria and abundant rough endoplasmic reticulum in TEM images indicate a high metabolic capacity of transitional stem cells.

Figure 1: Experimental Outline

Take Home Message

We have successfully isolated and cultured stem cells from normal and laminitic equine hoof tissue. Cells from normal and affected hooves are morphologically similar; however there are some differences in stem cell immunophenotype percentages between the two conditions. We isolated transitional stem cells from normal and affected tissue that have promising regenerative capacity. Future studies will focus on further characterization of this stem cell type to target laminitis prevention and treatment strategies.

References


**Funding**

This study was funded by a Charles V. Cusimano Equine Health Studies Program grant, Equine Health Studies Program (EHSP), Louisiana State University School of Veterinary Medicine. The authors declare no conflicts of interest.

**Acknowledgements**

Special thanks to Michael Keowen and Marilyn Dietrich for their help with this project.
Effects of Metronidazole and Flunixin Meglumine on Equine Right Dorsal Colonic Mucosa

Authors/Investigators
K. Shell, C. Koch, F. Del Piero, R. McConnico. Dept. of Veterinary Clinical Sciences and Dept. of Pathobiological Sciences, Louisiana State University, School of Veterinary Medicine, Baton Rouge, LA.

Introduction
One of the overall goals for the Charles V. Cusimano Equine Physiology and Pharmacology Laboratory is collaborative research relating to gastrointestinal diseases. Acute equine colitis is an example of a frequent cause of rapid, severe, debilitation and death in horses where over 90 percent of untreated horses die or require euthanasia. Horses that are treated appropriately will usually respond and gradually recover over a seven to 14 day period. Acute equine colitis-associated diarrhea is sporadic in occurrence and is characterized by intraluminal sequestration of fluid, moderate-to-severe colic, and profuse watery diarrhea, with resultant endotoxemia, leukopenia, and hypovolemia. The condition can affect adult horses of all ages, but usually occurs in horses between the ages of 2 and 10 years. Disease onset is sudden with rapid progression and is often preceded by a stressful event. A definitive diagnosis is made in only about 20-30 percent of cases. Most ante- and post-mortem diagnostic tests to determine etiology remain speculative. Treatment of the condition in horses is extremely costly because of the substantial volumes of intravenous fluid required. At present, there is no curative treatment for acute diarrhea in horses, and treatment strategies are directed at rehydration, electrolyte and plasma protein replacement, anti-endotoxemia therapy, and antimicrobial therapy when indicated.

Metronidazole (MZ) and flunixin meglumine (FM) are commonly used drugs for treating equine colitis. While the potential of FM to contribute to the pathophysiology of colitis has been known for a while, effects of MZ on the intestinal mucosa are controversial and have not been studied in horses. The aim of this study was to investigate the effect of FM, MZ and a combination of these drugs on the equine colonic mucosa.

Objective
To determine the effect of metronidazole and flunixin meglumine on mucosal permeability, goblet cell depletion and thinning of the mucosal layer of the equine colon.
Methods
Equine right dorsal colonic tissue of 10 horses being euthanized for natural unrelated diseases was studied in Ussing chambers. Tissue was treated with therapeutic dosages of MZ, FM, combined MZ and FM, or no medication (negative control). Transepithelial resistance (TER) as an indicator of tissue permeability, and direct measurement of mucosal to serosa fluxes with fluorescein labeled LPS were recorded. Histological tissue evaluation was performed.

Results
Treatment of equine dorsal colonic with MZ did not increase colonic mucosal tissue permeability. Increased tissue permeability due to treatment with FM was decreased with a combined treatment with MZ, thus suggesting a protective effect. The mucous layer of the colon remains intact with MZ treatment, but not with FM alone.

Take Home Message
Systemic metronidazole treatment may provide protection to equine colonic mucosa in cases of acute colitis in horses treated with or without flunixin meglumine.

References
Acupuncture and Therapeutic Massage Treatment and The Attenuation of Salivary Cortisol Levels in The Domestic Horse

Authors/Investigators
SE Gautreaux, C Koch, NH Walker, and RS McConnico. Equine Health Studies Program, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA

Introduction
Stress continues to be a concern for horses used for human pleasure. The goal of this study was to determine effective methods for stress reduction in the practice of equine well-being. Both acupuncture and therapeutic massage have been proven to reduce stress in humans; however, evidence based research is needed to support its use in equine veterinary medicine.

Objective
To determine if acupuncture and/or therapeutic massage may be an effective method of reducing stress in the adult horse by evaluating salivary cortisol levels as an indirect measure of stress levels in pastured adult horses.

Methods
Twelve horses from the LSU School of Veterinary Medicine teaching herd were evaluated in a controlled cross over study. Twelve horses were divided into three groups of four and rotated between four treatments (1) acupuncture, 2) deep tissue massage and 3) grooming only. Treatment sessions lasted for two weeks each. Horses in each respective group received designated treatments two times per week and saliva was collected as a means to indirectly measure cortisol levels after treatment using a snaffle bit with cotton and plastic webbing left in place for 35 minutes. In addition, saliva was collected from each horse three days pre- and post-each treatment session. Salivary cortisol was measured using a cortisol enzyme immunoassay and with samples run in duplicate.

Results
There is marked individual animal variability both within and between animals that require additional animal numbers for the determination of statistical significance in this study. However, when animals were assessed individually, there was a trend for decreased cortisol production between time 0 (pre-sample) and either first, second, or both treatment sessions during the first week of treatment. The study also suggests the salivary cortisol values can be a useful and non-invasive test in determining treatment differences in stress in horses.

Take Home Message
Acupuncture therapy and/or therapeutic massage may be an effective method for reducing stress in healthy individual horses.
References


Malinowski, K Stress Management for Equine Athletes Rutgers Cooperative Extension Fact Sheet.


The Effects of Purina® Outlast™ Gastric Supplement on Equine Gastric Health Parameters

A SUMMARY OF RESEARCH CONDUCTED BY PURINA ANIMAL NUTRITION EVALUATING THE EFFECTS OF A PROPRIETARY MINERAL COMPLEX ON GASTRIC HEALTH IN TRAVELING DRAFT HORSES.

< INTRODUCTION >

Horses exercising and traveling for long periods of time can be at greater risk for gastric discomfort. Confinement, meal feeding, new environments and the overall stress of travel can all contribute to this challenge. In addition, research has shown that gastric ulceration is related to low pH levels in the stomach. Nutritional interventions that support optimal gastric pH may help to reduce this risk. Previous research has shown that Purina® Outlast™ Gastric Supplement supports an optimal gastric pH in multiple trials. Therefore, the objective of this study was to determine if feeding Purina® Outlast™ Gastric Supplement would alter gastric imbalance in horses during a 30-day course of exercise and travel.

< MATERIALS AND METHODS >

Fourteen mature, draft geldings (884 ± 14 kg) were initially screened for gastric ulcers via endoscopy. Horses were then assigned to CON (n=7; no added supplement) or OL (n=7; supplement), top-dressed at 227 g/head/d of active ingredient. Next, 9 horses (4 CON, 5 OL) traveled approximately 1610 km via tractor trailer over 3 days, were hitched 4 times over 6 days then returned home over another 3 day trip, covering an additional 1610 km. Housing for the trial varied between permanent and tie stalls. Horses were fed concentrate feeds (Purina® Omoine #100® at 0.9 – 1.8 kg/d, Enrich Plus® at 0.5 – 0.9 kg/d, Amplify® Supplement at 0.9 kg/d, n=12; Ultium® at 1.8 kg/d, n=1; Enrich Plus® at 0.9 kg/d, n=1) along with 15 kg grass hay/d to meet or exceed NRC requirements. On day 30, horses underwent a second endoscopy. All feeds and forage were withheld for 16-18 hours prior to scoping. Findings were noted as overall equine gastric ulcer score (EGUS), glandular ulcer number (GN), glandular ulcer severity (GS), non-glandular ulcer number (NGN), non-glandular ulcer severity (NGS), desquamation, hyperkeratosis and hyperemia. The veterinarian performing the procedures was blinded to treatment. Body weight was measured via electronic scale. Analysis of variance was done with mixed models using GLIMMIX procedure in SAS, and least squares means were compared using Fisher’s least significant difference (P<0.05).

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⁴Gordon, M, Vineyard, K,R, Andrews, F, HR 212, 2016; EUS/ulceration study
< RESULTS 

The control group showed an increase in NGN from day 0 to day 30 (P=0.0375), while no change occurred in the Outlast™ supplemented group (P>0.05, Figure 1). There was also a trend for GN to increase in the control group by day 30 (P=0.007), but no change in the Outlast™ supplement group (P>0.05, Figure 2). There were no differences in ECUS, GS, NGS, desquamation, hyperkeratosis or hyperemia for treatment or time (P>0.05) for all horses overall. When data were analyzed for traveling horses only, an increase in EGUS became evident in the control group (P=0.0474) but not the Outlast™ supplemented group (Figure 3).

< IMPLICATIONS 

In conclusion, control horses with no added Purina® Outlast™ gastric supplement had an increase in non-glandular ulcer number and a trend for more glandular ulcers than horses receiving the supplement. Similarly, traveling horses in the control group had an increase in overall EGUS, while the treatment group did not. Providing at-risk horses this mineral complex supports gastric health during times of travel.
ALTERATIONS IN EQUINE GASTRIC pH BY PURINA® OUTLAST™ GASTRIC SUPPLEMENT

INTRODUCTION

Horses evolved as grazing animals and as such, are meant to devote much of their day to trickle feeding or chewing feedstuffs in small amounts over long periods of time. To that end, horses constantly secrete stomach acid to assist with the digestion of their feed and forage, which is naturally buffered by bicarbonates secreted in saliva as horses chew. In modern management practices, however, horses spend more time confined and eating distinct meals of feed, which can lead to less chewing and higher levels of acid in the stomach. In addition, exercising horses during periods of high stomach acidity has been attributed to increased gastric discomfort. Therefore, a series of research trials were conducted at Louisiana State University, in which horses were fed meals with and without Purina® Outlast™ Gastric Supplement to test the hypothesis that this proprietary mineral complex would support optimal stomach acid more than a control feed. Successfully buffering stomach acid for horses could be an important factor in managing horses’ gastric comfort.

MATERIALS AND METHODS

In trial 1, twenty mature, healthy TB geldings were housed in stalls and on testing day were fasted for 16 hours prior to gastric endoscopy. Gastroscopy was performed using a 3-meter endoscope for collection of gastric juice for pH measurement. After collection, horses immediately received either 0.5 lb/500 kg BW of a control pellet or 0.5 lb/500 kg BW of a treatment pellet containing Outlast™ gastric supplement. Two hours later, horses received a second endoscopy for collection of gastric juice and pH measurement. In a second trial, nine TB geldings were housed in stalls and on testing days 6, 7, and 14, the horses received 1 of 3 dietary treatments (CON, Outlast1x, Outlast2x) in a randomized, crossover design at a rate of 45.4 g/100 kg BW along with 0.55 kg Purina® Omolene 100® horse feed. CON contained no added minerals, Outlast1x contained minerals at a lower concentration, and Outlast2x contained minerals at 2x the concentration of Outlast1x. The final on-market formulation of Outlast™ gastric supplement is formulated at the 2x concentration. All horses underwent gastroscopy prior to feeding the treatments, and at 2 and 4 hours post-feeding. For both trials, gastric juice (60 ml) was aspirated from the biopsy channel and pH measured in duplicate using a benchtop pH meter. Analysis of variance was done with mixed models using GLIMMIX procedure in SAS, and least squares means were compared using Fisher’s least significant difference (P<0.05).
<RESULTS>

For trial 1, at 2 hours post-feeding, gastric pH was higher in the treatment group receiving Outlast™ supplement than the control group (Figure 1). For trial 2, there was a significant time effect (P<0.0001) with an increase in gastric juice pH from time 0 (2.31 ± 0.48) to 2 hours (5.52 ± 0.48) and 4 hours (3.59 ± 0.48). Gastric juice pH at 2 hours was higher (P=0.0122) in Outlast1x (5.76 ± 0.58) and Outlast2x (5.92 ± 0.57) than CON (4.88 ± 0.58, Figure 2).

<IMPLICATIONS>

In conclusion, providing horses at risk for gastric ulcers a feed or supplement containing Purina Outlast™ Gastric Supplement may help to achieve optimal gastric pH. The increase in pH lasted for at least two hours under these described feeding and management conditions. For horses at risk for gastric ulcers or gastric discomfort, Purina Outlast™ Gastric Supplement may help support proper gastric pH.

<AVAILABLE UPON REQUEST>

Contact your local Purina representative if you would like more information about this study.
Effects of Hydrolyzed Collagen on Equine Gastric Ulcers Scores and Gastric Juice pH in Horses

Frank M. Andrews¹, Pilar Camacho-Luna¹, Lisa Micheau², Michael L. Keowen¹, Frank Garza, Jr.¹, Chin-Chi Liu¹, Brian Lamp³, Jos Olijve⁴

¹ Equine Health Studies Program, Department of Veterinary Clinical Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA, USA

² Ecole Nationale Veterinaire De Toulouse, Toulouse, France

³ Sonac - Darling Ingredients, Mukwonago, Wisconsin, USA

⁴ Sonac - Darling Ingredients, Son, The Netherlands

Introduction

Horses have a compound stomach (Fig 1), and up to 90% of performance horses suffer from gastric ulcers. Omeprazole (Gastrogard®, Merial LTD, Duluth, GA) is FDA-approved in the US for treating gastric ulcers. However, it is expensive and must be given daily during training and racing, which most performance venues do not allow. In addition, ulcer recurrence is common after discontinuing treatment. Thus, the development of effective management strategies and natural feed supplements to prevent ulcer recurrence and promote stomach health is needed. Hydrolyzed collagen (HC) (Darling Ingredients, Irving, TX, USA) is a supplement containing bioactive peptides and Type 1 Collagen, which promotes gastric health.

The purpose of this study was to evaluate the effect of hydrolyzed collagen (HC) on ulcer scores and gastric juice pH in stall-confined horses.

Hypothesis

Hydrolyzed collagen (HC) prevents the worsening of gastric ulcers in stall-confined horses after omeprazole treatment and intermittent feeding, without long-term alteration of gastric juice pH.

Methods

Thoroughbreds (n=10) were moved to stalls and subjected to two treatments in a 56-day two period crossover study timeline (Fig 2). One group received 45g HC (Mw 2.5kDa from porcine bone, Sonac) mixed with 1kg sweet feed (Omelene 100, Purina Animal Nutrition). The control group (C) received 1kg sweet feed only. The sweet feed and mixed grass hay (1.5% body weight) was given twice daily for two 56 days periods. From day 14-28, both groups received omeprazole (4.0mg/kg). From day 42-49, horses underwent a feed-deprivation period, to induce ulcers. Gastroscopy (Fig 3) was performed on day -1 (before treatment) and days 14, 28, 42, 49 and 56. Gastric juice was aspirated and pH was measured at each scoping. Nonglandular gastric ulcer number (NGN) and severity (NGS) scores, 0 (no) to 5 (severe) were assigned by a masked investigator (FMA) (Table 1). ANOVA for repeated measurements and a post-hoc Tukey test were used to determine significant differences, P < 0.05.
Results

HC, mixed with grain, was readily eaten by all horses, and did not result in any adverse effects.

There was a period effect and data was pooled for statistical evaluation.

Overall, mean gastric ulcer scores were lower during Period 2 of the study, due to acclimation to stalls.

Mean NGS and NGN gastric ulcer scores were lower at each gastroscopy examination and a significant treatment effect was seen in NGN on day 56 of the study (Figs 5).

Gastric juice pH values were low and variable throughout the trial, except on day 28 when pH was significantly higher in HC supplement-treated group compared to control group while on omeprazole treatment.(Fig 6).

Discussion and Conclusions

Hydrolyzed Collagen-fed horses had fewer and less severe ulcers throughout the trial and significantly fewer ulcers were seen after 56 days of feeding.

Hydrolyzed Collagen ameliorated the severity of gastric ulcers in stall-confined horses undergoing stall confinement and feed stress (Fig 7).

Acknowledgments

The authors thank the technicians, lab assistants, and student workers who supported this study. Funding for this study was provided by Darling Ingredients, the Equine Health Studies Program (EHSP), Louisiana State University School of Veterinary Medicine.
Figures

Fig 1. Compound equine stomach, showing the glandular and nonglandular regions.

Fig 2. Timeline for Period 1, whereby horses were scoped on days 0, 14, 28, 42, 49, and 56. The period was repeated after at least a 2-week washout, with the treatment and control groups switched, so that each horse served as his own control.

Fig 3. Horses were first sedated with xylazine. Then, gastroscopies were performed using a 3 m endoscope (Karl Storz, El Segundo, CA).

Fig 5. Mean Nonglandular Severity Score (NGS; 0-5) on Day 0 (before) and Days 14, 28, 42, 49 and 56 of feeding Hydrolyzed Collagen (Collagen; 45 g, mixed in grain twice daily). Horses were given omeprazole paste (4.0 mg/kg, orally, once daily), Day 14 to 28 and exposed to an alternating feed deprivation model from Days 42 to 49. Different lower case letters denote significant day (P<0.05) differences.

Fig 6. Mean endoscopic nonglandular number score (NGN 0-4) in horses on Day 0 (before) and Days 14, 28, 42, 49 and 56 after feeding HC (45 g, mixed in grain twice daily). Horses were given omeprazole paste (4.0 mg/kg, orally, once daily) from Day 14 to 28 and horses were exposed to an alternating feed deprivation model from Days 42 to 49. Different lower case letters denote significant (P<0.05) day and treatment*day differences.

Fig 7. Mean gastric juice pH in horses on Day 0 (before) and Days 14, 28, 42, 49 and 56 after feeding HC (45 g, mixed in grain twice daily). Horses were given omeprazole paste (4.0 mg/kg, orally, once daily) from Days 14 to 28 and horses were exposed to an alternating feed deprivation model from Days 42 to 49. * denotes a significant treatment by day effect and a denotes a significant day effect.
Fig 8. Gastrosopic pictures of the nonglandular region of the stomach on days 0, 14, 28, 42, and 56. Nonglandular Ulcer Number score was significantly (P<0.05) lower in HC-treated horses by Day 56. Also, ulcer scores decreased in both the treatment and control horses after omeprazole treatment (day 28).
Elimination of the Use of Rubber Stall Mats for Effective Intervention of Nosocomial *Salmonella Enterica Spp.* Infection in a Veterinary Teaching Hospital

Authors/Investigators
RS McConnico, RW Stout, FM Andrews, AF Roy, Dept. of Veterinary Clinical Sciences, Dept. of Pathobiological Sciences, School of Veterinary Medicine, Louisiana State University.

Introduction
Outbreaks of nosocomial Salmonella infections in hospitalized horses can occur when surveillance and infection control protocols are either not in place or not implemented well. Over the past few decades multiple scenarios have been reported where referral hospitals, predominantly veterinary teaching institutions, have experienced the consequences associated with patient hospital-acquired infection (HAI) such as increased morbidity or mortality, zoonotic infections, hospital closings, and declining case-loads due to poor publicity. The overall objective of this report is to show the importance of facility management in an equine hospital biosecurity program specifically as it relates to providing cleanable stall flooring.

Methods
A nosocomial outbreak involving two serovars of *Salmonella enterica spp.* (serovars Javiana and Agona) in a population of hospitalized horses resulted in re-evaluation of current hospital biosecurity measures in the large animal section of the LSU Veterinary Teaching Hospital (VTH). Evaluation of the VTH Salmonella patient and environmental surveillance and tracking information was suggestive of certain trouble spots with repeated positive environmental and patient fecal samples. Interventional control measures included re-evaluating the standard operating biosecurity procedures, ensuring appropriate training sessions for hospital personnel, re-evaluating and modifying bedding and manure disposal, removing items considered to be non-cleanable, painting the interior of the facility with a nontoxic readily cleanable epoxy-type paint, replacement of stall walls with cleanable synthetic surfaces, and removing the non-cleanable rubber stall mats. These changes had previously been instituted in the equine and large animal intensive care unit, except for the elimination of the rubber stall mats.

Results
When rubber stall mats were removed and replaced with a poured flooring material, the outbreak situation in the ICU was able to be controlled, and, subsequently, the main large animal hospital patient housing and care areas. Prevention of nosocomial infection requires a multifaceted approach and care must be taken to search out covert sources of contamination, such as the rubber stall mats, when standard intervention procedures do not prevent spread of the disease.
Take Home Message

Prevention of nosocomial infection is multi-modal and requires continued awareness, a committed team-oriented approach and strict enforcement of biosecurity policies and procedures. Rubber mats may deteriorate and warrant closer inspection as a possible source of environmental Salmonella contamination.

References


Assessment of tuber coxae bone biopsy in the standing horse

Authors/Investigators
Colin Mitchell, BVM&S, MS, Dipl. ACVS, Department of Veterinary Clinical Sciences; Margaret A. McNulty, PhD, Department of Comparative Biomedical Sciences; Heather Richbourg, Department of Comparative Biomedical Sciences; Ashley Gillett, 4th-year student; Brad Goupil, Department of Comparative Biomedical Sciences; School of Veterinary Medicine, Louisiana State University

Introduction
Equine bone structure and function can be evaluated for clinical or research investigation of pathologic, pharmacologic and physiologic processes. Noninvasive diagnostic techniques are reported but provide insufficient samples for assessment of bone architecture, or measurements of remodeling and mineral apposition. Invasive bone biopsies remain the gold standard for quantitative assessment of bone remodeling, and efforts have previously been made to find the least invasive method to obtain adequate bone samples from horses. Samples must be large enough for the architecture to be undamaged by the biopsy technique, must provide enough tissue for multiple histologic sections to be examined and be of sufficient quality to assess trabecular and cortical bone.

The tuber coxa is easily accessible, with minimal soft tissue coverage, and biopsy from this area has been described in cadaveric or standing horses using specialized equipment; however, samples were not consistently of adequate histologic quality. The live horses had minimal morbidity associated with the procedure. The contralateral tuber coxa can be biopsied at a future time point if sequential samples are necessary to monitor or identify changes in remodeling or architecture, or for pharmacologic investigation. Since the tuber coxa is a non-weight bearing region, an aggressive bone biopsy to obtain a larger sample can be performed without the risk of disrupting function.

The objective of this study is to describe a technique of bone biopsy from the tuber coxae in standing horses using an oscillating saw that provides a larger biopsy than previously described using core trephine techniques. We propose the biopsy will have intact, undamaged cortical and trabecular architecture and be of sufficient size to allow examination of multiple sections. We propose that this technique will be associated with minimal morbidity in horses.

Experimental Design
Ten young horses (<5 years of age) will be used for this study. Unilateral biopsy of the tuber coxae will be performed on each horse on Day 0. The horses were monitored overnight in a stall, before being turned out to pasture. At Day 60, the second biopsy was obtained from the contralateral tuber coxae with similar exercise restrictions post biopsy.

Biopsy in standing horse
The biopsy technique was performed using sedation and local anesthesia. A 6-8 cm, vertically oriented skin incision was made with its mid point over the palpable portion of the proximal tuber coxa. A combination of sharp and blunt dissection was used to expose the tuber coxa on its cranial, caudal, proximal and axial margins. The periosteum was incised, and an oscillating saw was used to transect the protuberance of the tuber coxa, at least 1cm distal to the proximal edge.

The saw blade was continuously lavaged with saline to limit thermal injury to the bone. The excised section of bone representing the biopsy was at least 1 cm tall, with the width and length of the biopsy dependent on each horse’s pelvic anatomy. The goal was to obtain the largest biopsy possible without cutting into the iliac crest on the axial border of the tuber coxa. The surgery site was lavaged, and the biopsy site was sutured.

The biopsies were fixed in 10 percent formalin, and all were prepared for MicroCT examination. Day 0 biopsies were also prepared for decalcified histology and the Day 60 biopsies were also prepared for undecalcified histology. All sections were evaluated under light microscopy and, using a semi quantitative scale, were graded to be of useless, poor or good quality.

**Results**

All of the horses tolerated the procedure well and displayed minimal morbidity following the procedures. One surgical site (1/20 biopsy sites) dehisced shortly after the biopsy but was managed with local wound care. This proceeded to heal uneventfully. No horses displayed any signs of moderate pain or lameness on the biopsied limbs at any time over the study period. MicroCT evaluation was possible in all samples, with large amounts of intact trabecular and cortical bone present. The mean biopsy volume was 3123.72 mm3. Histologic evaluation of the samples was possible and adequate for examination of cortical and trabecular bone in both decalcified and undecalcified preparations.

**Take Home Message**

This biopsy technique was well tolerated by the horses and was associated with minimal morbidity. This technique provides a considerably larger sample of bone with significantly fewer complications than other currently performed techniques. The biopsies collected in this study were able to be evaluated using multiple techniques and were all of diagnostic quality, indicating that this is a viable biopsy technique for researchers investigating bone remodeling, healing or performing pharmacologic studies.

**Funding**

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

**Year Completed**

2014-2016.
Influence of clodronate on bone density and bone formation in young horses

Authors/Investigators
Colin Mitchell, BVM&S, MS, Dipl. ACVS, Department of Veterinary Clinical Sciences; Margaret A. McNulty, PhD, Department of Comparative Biomedical Sciences; Heather Richbourg, Department of Comparative Biomedical Sciences; School of Veterinary Medicine, Louisiana State University

Introduction
Orthopedic disease is a major performance limiting problem for equine athletes. Analgesics, anti-inflammatories, regenerative therapies and supplements are all routinely used to try and help maintain, correct or prevent injury from occurring. New therapies are being investigated, and clodronate is one that has demonstrated some beneficial effects on horses with navicular disease.

Clodronate is a bisphosphonate drug that was investigated as a treatment for diseases such as Paget's disease or osteoporosis in humans but has now been replaced by more potent alternatives. These diseases result in an uncoupling of the remodeling process, with osteoporosis leading to a decrease in overall bone density, whereas Paget's disease initially starts as a resorptive disease with further complications following production of excessive, disorganized new bone. When administered, clodronate has been shown to inhibit bone resorption by causing osteoclast apoptosis and disrupting the formation and secretion of proinflammatory mediators. This reduction in proinflammatory mediators may be what causes the analgesia that has been observed in human patients treated with this drug.

Histopathology and histomorphometry have been performed on multiple species treated with clodronate, at varying doses and durations. Clodronate, like tiludronate, was able to ameliorate the decreases in bone mineral density following various surgical or pharmacologic treatments in other species. No histopathologic or histomorphometric study has been performed in horses, and, since this drug is being more widely used in a clinical setting, including young horses to treat navicular disease or bone pain, the effects on normal bone remodeling in horses should be investigated.

Experimental Design
Ten young horses (<5 years of age) will be used for this study. Five horses will be in the treatment group and will receive clodronate, with the other five being treated with a placebo (saline). Unilateral biopsy of the tuber coxae will be performed on each horse. After collection of the first biopsy, clodronate (1.8mg/kg) will be administered IM. The control group will receive only saline. The horses will then be placed in a stall in the research barn overnight for monitoring, before being turned out the following morning. Thirteen days prior to the second biopsy, oxytetracycline (25mg/kg IV) will be administered. This dose of oxytetracycline will be repeated three days prior to the second biopsy being performed. Sixty days after clodronate administration, we will collect the second biopsy, from the contralateral tuber coxae. The original tuber coxae will be biopsied again using an identical approach to evaluate the effects following 60 days of healing, which Micro CT of bone
is an additional component of this study. The biopsy procedure and the sample processing techniques are described in more detail in the abstract “Assessment of tuber coxae bone biopsy in the standing horse.”

**Results**

At this time we are still analyzing the collected data, and no results regarding the impact of the drug on bone remodeling and healing are available.

**Take Home Message**

This treatment and the biopsy technique are well tolerated by the horses. This drug could be helpful in altering bone remodeling and healing, but further studies need to be completed.

**Funding**

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

**Year Completed**

In progress.

**Influence of tiludronate on bone density and bone formation in young horses**

**Authors/Investigators**

Colin Mitchell, BVM&S, MS, Dipl. ACVS, Department of Veterinary Clinical Sciences; Margaret A. McNulty, PhD, Department of Comparative Biomedical Sciences; Heather Richbourg, Department of Comparative Biomedical Sciences; School of Veterinary Medicine, Louisiana State University

**Introduction**

Orthopedic disease is a major performance limiting problem for equine athletes. Analgesics, anti-inflammatories, regenerative therapies and supplements are all routinely used to try and help maintain, correct or prevent injury from occurring. New therapies are being investigated, and tiludronate is one that has demonstrated some beneficial effects on horses with navicular disease and back pain.

Tiludronate is a bisphosphonate drug that was investigated as a treatment for diseases such as Paget’s disease or osteoporosis in humans but has now been replaced by more potent alternatives. Tiludronate has been shown to inhibit bone resorption by causing osteoclast apoptosis and disrupting the formation and secretion of proinflammatory mediators.

Histopathology and histomorphometry have been performed on multiple species treated with tiludronate at varying doses and durations. Tiludronate is able to ameliorate the decreases in bone mineral density following various surgical or pharmacologic treatments in other species. No histopathologic or histomorphometric study has been performed in horses and since this drug is being more widely used in a clinical setting, including young horses to treat navicular disease or bone pain, the effects on normal bone remodeling in horses should be investigated.
Experimental Design

Ten young horses (<5 years of age) will be used for this study. Five horses will be in the treatment group and will receive clodronate, with the other 5 being treated with a placebo (saline). Unilateral biopsy of the tuber coxae will be performed on each horse. After collection of the first biopsy, tiludronate (1 mg/kg) will be administered IV, diluted in 1L of 0.9% saline, over 90 minutes. The control group will receive only saline. The horses will then be placed in a stall in the research barn overnight for monitoring, before being turned out the following morning. Thirteen days prior to the second biopsy, oxytetracycline (25mg/kg IV) will be administered. This dose of oxytetracycline will be repeated three days prior to the second biopsy being performed. Sixty days after tiludronate administration, we will collect the second biopsy, from the contralateral tuber coxae. The biopsy procedure and the sample processing techniques are described in more detail in the abstract “Assessment of tuber coxae bone biopsy in the standing horse”.

Results

There were no significant changes in bone structure parameters as evaluated by microCT. Comparing Day 0 biopsy to Day 60 biopsy, tiludronate treated horses had significantly increased trabecular bone thickness. There were no significant differences in bone remodeling parameters after 60 days.

Take Home Message

This treatment and the biopsy technique was well tolerated by the horses. Tiludronate was not found to significantly alter the bone that was investigated. This may indicate that the drug may help alleviate pain by some other mechanism of action other than was investigated in this study, or the timeframe was not long enough to identify significant changes within the tissue. The region of the pelvis that was biopsied is non weight bearing, which may also have influenced the results, although the drug is found to concentrate in this region. This drug could be helpful in altering bone remodeling and healing, but further studies need to be completed.

Funding

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

Year Completed

2014-2016.
Preeclamptic Mouse Model: Investigation of the Embryo-Uterine Interactions that Will Improve Mare-Foal Outcomes

Authors/Investigators

Jenny L. Sones1,2, Jeeyeon Cha3, Ashley K. Woods1, Amanda Bartos3, Christa Y. Heyward1, Heinrich E. Lob1, Catherine E. Isroff1, Scott D. Butler1, Stephanie E. Shapiro1, Sudhansu K. Dey3, Robin L. Davisson1,4

1Biomedical Sciences, College of Veterinary Medicine, Cornell University, Ithaca, NY 14853; 2Veterinary Clinical Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA 70803; 3Division of Reproductive Sciences, Cincinnati Children’s Research Foundation, Cincinnati, OH 45229; 4Cell and Developmental Biology, Weill Cornell Medical College, New York, NY 10021

Introduction

Preeclampsia is a devastating disorder of pregnancy that manifests as late gestational maternal hypertension but can be life-threatening to both mother and baby. It is believed that abnormal placentation is responsible for the cascade of events leading to the maternal preeclamptic syndrome; however, the exact mechanisms are unknown. Embryo implantation is critical to establishing a healthy pregnancy. Defective implantation may contribute to adverse “ripple effects” leading to abnormal placentation, retarded fetal development and poor pregnancy outcomes, such as preeclampsia, fetal growth restriction and pregnancy loss.

Objectives

The objectives of this study were to utilize the spontaneous mouse model of preeclampsia, BPH/5, to investigate the peri-implantation period and test the hypothesis that aberrations early in pregnancy contribute to poor fetal and placental development, as well as the maternal preeclamptic syndrome in this model.

Methods

BPH/5 and control C57 implantation sites were collected from pregnant mice during the peri-implantation period and subjected to molecular analyses, qRT-PCR, in situ hybridization, Western blotting, ELISA, was used to identify dysregulated implantation signaling molecules. Flow cytometry was utilized to characterize the immune cell population at the maternal-fetal interface in these implantation sites. Fetal health status was determined by ultra-high frequency ultrasonography, and maternal hypertension was assessed by radiotelemetry.

Results

• BPH/5 exhibit peri-implantation defects at the maternal-fetal interface:
  o Upregulation of cyclooxygenase 2 (Cox2) and interleukin 15 (IL-15)
  o Decreases in decidual natural killer (dNK) cells, which have an important role in establishing placental perfusion
• Administration of a selective Cox2 inhibitor (celecoxib) during early pregnancy improved BPH/5 pregnancy outcomes:
  o Restrained decidual Cox2 and IL-15 expression
  o Restored dNK cell numbers

• Increased fetal growth and attenuated late gestational maternal hypertension

Conclusions
• Decidual overexpression of Cox2 and IL-15 may trigger adverse pregnancy outcomes
• Cox2 inhibition may be a targetable strategy to prevent fetal and maternal morbidity/mortality

Translational Aspects
Ongoing efforts in the Theriogenology section at LSU SVM includes taking a similar molecular approach to investigate the embryo-uterine interactions in the mare and how adverse ovarian hormone signaling can have “ripple effects” on pregnancy outcomes in the horse.

Published Manuscripts/Abstracts


JL Sones, CY Heyward, D Lessard, SD Butler, HE Lob, RL Davisson. Normalization of Uterine Interleukin (IL)-15 in the BPH/5 Preeclamptic Mouse Improves Decidual Natural Killer Cell Activation at the Maternal-Fetal Interface. (Hypertension. 2015; 66:A039)

JL Sones, SD Butler, SE Shapiro, J Cha, SK Dey, RL Davisson. Cox2 Inhibition in Early Pregnancy Improves Adverse Outcomes in the BPH/5 Mouse Model of Preeclampsia. (FASEBJ. Vol. 29, No. 1 [Supplement 684.11]).

JL Sones, SD Butler, CE Isroff, J Cha, SK Dey, RL Davisson. Cox2 Inhibition During Decidualization Improves Fetal Growth Restriction In The BPH/5 Mouse Model Of Preeclampsia. (Hypertension. 2014; 64:A094; Best of AHA [top 10%] accepted abstracts)

JL Sones, HE Lob, CE Isroff, J Song, E Williamson, RL Davisson. BPH/5 Pre-eclamptic Mice Have Increased Uterine Interleukin (IL)-15 and This Is Associated with Decidual Natural Killer (dNK) Cell Loss At The Maternal-Fetal Interface Early In Pregnancy. (Hypertension. 2014; 64:A028; Best of AHA [top 10%] accepted abstracts)

Funding (Sones)

Louisiana Biomedical Council Research Program, The role of maternal adipose tissue in the preeclamptic-like BPH/5 mouse. $50,000.

NICHD National Centers for Translational Research in Reproduction and Infertility, Cornell Center for Reproductive Genomics (Seed grant), The role of microRNAs in defective periimplantation signaling observed in the spontaneous BPH/5 mouse model of preeclampsia. $7,500.

American Heart Association, Postdoctoral Fellowship. Role of asynchronous embryo-uterine interactions during the peri-implantation period in a mouse model of preeclampsia. $96,000.
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

Endowed chairs and professorships provide perpetual support for outstanding faculty members. Donors give at least $1.2 million to establish a chair, and the state provides an $800,000 match, yielding a total endowment of $2 million. A professorship is funded through a $240,000 gift from a donor that the state matches with $60,000, yielding a $300,000 endowment. Each chair or professorship is named by the donor who funds it. A portion of the earnings generated by the endowment fund for a chair is typically spent to supplement the chair holder’s salary, as well as provide additional income for such special purposes as purchasing publications that complement the chair’s work, hiring graduate and post-doctoral students to assist in research projects and buying research equipment that could not otherwise be made available. An endowed professorship provides resources to recognize a professor for academic achievement and enables him or her to pursue research and/or innovative teaching methods.

Equine Biomedical Research

Private gifts can provide funds for leading-edge science specific to the horse. With the limited amount of state and federal funding available for equine scientific investigations, funds from private, charitable gifts are critical to improve successful prevention and treatment of illnesses and injuries that can be performance-limiting, career-ending and even life-threatening.

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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)

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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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