



Diggin' DEEP

You don't win at barrel racing without digging deep around those critical corners — and the same can be said for achieving success in the arena of equine health research. This year, five teams at the Western College of Veterinary Medicine are rising to the challenge and taking an in-depth look at health issues that affect horses around the world. WCVM's Equine Health Research Fund is supporting the scientists' studies with nearly \$70,000 — essential research funding that comes directly from members of Western Canada's horse industry.

What's the shelf life of pergolide mesylate?

Drs. Trish Dowling and Katherine Ball, WCVM; and Dr. Gordon McKay, U of S College of Pharmacy and Nutrition

Pituitary pars intermedia dysfunction (PPID) — or equine Cushing's disease — is a significant health problem in senior horses, affecting one in 10 horses more than 20 years of age. Affected horses commonly suffer career-limiting and potentially fatal complications such as laminitis and chronic infections.

In many cases, PPID can be successfully managed with the dopamine agonist *pergolide* that's normally administered orally as the mesylate salt. There's no approved veterinary formulation of pergolide in North America, and since the approved human formulations have been withdrawn from the market, veterinarians must rely on pergolide mesylate formulated from active pharmaceutical ingredients. However, the stability of pergolide mesylate in these formulations is currently unknown. This places treated horses at risk of treatment failure and devastating complications from sub-therapeutic doses.

In this study, the research team will measure the concentration of pergolide mesylate in oral solutions on eight different occasions during a 20-week period. The researchers will analyze three separate batches from three different pharmacies to determine the rate of pergolide degradation,

then compare results between pharmacies to determine if the different formulations behave similarly. By determining the stability of pergolide mesylate in compounded oral solutions, the research team will be able to recommend appropriate shelf lives and improve the use of pergolide in treating horses with PPID.

What's the most effective protocol for diagnosing *R. equi* pneumonia in foals?

Drs. Fernando Marqués, Steve Manning, Kristin Poirier, Katharina Lohmann, Andy Allen, John Pharr, Marianela López and Hugh Townsend

Rhodococcus equi is the most devastating cause of pneumonia in young foals and is of great economic significance in many parts of the world. The disease is characterized by chronic, progressive and often fatal pneumonia in foals between three weeks and five months of age. Pneumonic lesions develop slowly and clinical signs usually remain undetected until the disease is well advanced, a feature that increases the cost and limits the efficacy of treatment.

In this study, the research team will use an *R. equi* disease model that closely mimics natural disease. By following the foals from the time of infection, researchers will be able to determine the time at which disease

becomes detectable — providing new information on the early detection, timing and development of lung lesions.

This project's goal is to develop a sensitive and specific protocol for the diagnosis of *R. equi* pneumonia in foals as an aid to clinical veterinarians involved in the diagnosis, treatment and prevention of this disease. As well, the research team will provide clinical researchers with a reliable diagnostic outcome that can be used in experimental studies.

What plate technique is the strongest for pastern arthrodesis?

Drs. James Carmalt, David Wilson and Chris Bell

Horses that develop debilitating arthritis of the pastern joint are frequently middle-aged, highly-trained athletes and their inability to perform results in significant economic and emotional loss to their owners. The disease known as high ring bone is a common condition, especially in western performance horses, and was often career ending until surgical techniques to fuse the joint (arthrodesis) were developed.

Equine surgeons use one of two recommended techniques for fusing the pastern joint: one involves placing parallel screws across the joint while the second, more-preferred method consists of using a bone plate called the *limited contact-dynamic compression plate* (LC-DCP) combined with parallel screws. So far, no research team has compared the cyclic fatigue properties of this technique with the parallel screw method or with the new generation of bone plate — the *locking contact plate* (LCP).

LAMINITIS STUDY RECEIVES GRANT: This spring, the Heather Ryan and L. David Dubé Veterinary Health and Research Award allocated \$128,000 to a two-year WCVM investigation of laminitis — a severe health issue that affects horses around the world.

Led by Dr. Baljit Singh of WCVM's Veterinary Biomedical Sciences, the research team will evaluate the expression and function of Toll-like receptor (TLR) 4 and 2 in lamellar tissues from normal and inflamed equine hooves. TLR4 and TLR2 are innate immune molecules that activate cell signalling in response to bacterial products such as endotoxins. This activation of cells leads to the expression of inflammatory cytokines, the migration of activated neutrophils and tissue damage.

Based on previous research, Singh and his collaborators believe TLR4 and TLR2 play a central role in the development of laminitis. By inhibiting cell activation induced by TLR4 and TLR2, the team expects to be able to inhibit the development of laminitis in two models of this disease.

Singh, whose research focuses on the mechanisms of inflammation, will collaborate on this study with three people: Dr. Sarabjeet Suri, a molecular biologist; Dr. Hugh Townsend, a specialist in vaccine efficacy and infectious diseases; and Dr. David Wilson who has more than 20 years of experience in equine orthopedics.

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In this project, the research team will use the limbs of equine cadavers to biomechanically compare the cyclic fatigue properties of the LC-DCP augmented by 5.5 millimetre transarticular screws and the new LCP plate combined with transarticular screws. Based on the study's results, the team will determine which of the plate-augmented techniques provides equine patients with the strongest implant after surgery.

What are the characteristics of immune regulators in fertile and subfertile mares?

Drs. Claire Card and Sarah Eaton

Persistent post-mating uterine inflammation is the main cause of subfertility in mares. Subfertile mares usually have increased bacterial contamination of the genital tract with fecal and genital bacteria because of poor vulvar conformation and wind sucking. Genital tract contamination increases the probability of bacteria ascending, colonizing the uterus and contributing to endometritis. So far, no one completely understands how bacteria and sperm interact with the immune system in subfertile and fertile mares.

In this study, Dr. Claire Card and theriogenology resident Dr. Sarah Eaton will evaluate the immune mechanisms responsible for uterine inflammation in terms of certain key immune regulators: Toll-like receptors, neutrophils and cytokines. The scientists will also evaluate fertile and subfertile mares and analyze the effect of endometrial biopsy features, stage of cycle, season and breeding on these immune regulators.

Findings from this study will help clinicians understand the pathogenesis of excess uterine inflammation in mares that are subfertile and determine the tissue and cytologic features of mares with endometritis due to breeding. Eventually, the information will help to determine whether treatments that decrease cytokine production are an effective strategy to decrease uterine inflammation in subfertile mares.

What does a horse's nasomaxillary opening look like?

Drs. James Carmalt and Chris Bell

A horse's paranasal sinus system consists of six pairs of sinuses with a common drainage path (the nasomaxillary opening) to the nasal cavity. This path hasn't been clearly defined in the horse, and no one has a definite understanding of whether there's a single opening, two closely related openings from each of the rostral and caudal maxillary sinuses, or two distinct drainage pathways.

For veterinary surgeons, gaining a better understanding of the nasomaxillary opening's anatomy would be helpful since the pathway is vital to the normal clearance of the sinus system in health and disease. Conditions of the paranasal sinuses such as sinusitis, paranasal sinus cysts, neoplasia and ethmoid hematoma have a direct impact on the function and anatomy of the nasomaxillary opening.

During this study, Dr. James Carmalt and large animal surgery resident Dr. Chris Bell will describe the clinical and three-dimensional anatomy of the nasomaxillary opening in the horse using axial computed tomography (CT) and gross anatomy on equine cadavers. As a result, the researchers will be able to accurately describe the horse's nasomaxillary opening and its relations to paranasal sinus pathology. **H**