

BEVA Trust Queen Mother Travel Award – Report

**Colorado State University Equine Orthopaedic Research Centre
and
Veterinary Teaching Hospital**

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*** Out of respect for research and client confidentiality no pictures were taken. ***

I am greatly honoured to have been awarded the BEVA Trust Queen Mother Travel Award. The scholarship has allowed me to witness veterinary medicine being practiced at one of the best veterinary schools in the United States; as well as refine my own skills with regards to approaching equine orthopaedic diseases and observe the scientific and research-related aspects of the investigation into the aetiopathogenesis of orthopaedic disease and the therapeutic effects of current and novel treatments for equine musculoskeletal disorders.

The Gail Holmes Equine Orthopaedic Research Centre at Colorado State University opened in November of 2002 with the intention of solving problems associated with equine musculoskeletal disease through meticulous research into the aetiology of performance-related injuries and the development of novel treatments and diagnostic methods to improve and monitor equine performance and welfare. Over the years, several studies investigating the effects of novel therapies, such as IRAP (autologous conditioned serum), A-Cell (acellular porcine urinary bladder matrix), equine mesenchymal stem cell therapy, hyaluronic acid, polysulphated glycosaminoglycans, and pentosan polysulphate, have now resulted in many of these drugs becoming commonplace and frontline treatment for osteoarthritis in performance horses.

Whilst I was at the Orthopaedic Research Centre I was privy to the current research conducted at the facility. One ongoing study involved the investigation of the efficacy of intra-articular hyaluronic acid ± triamcinolone acetonide when compared with intra-articular polysulphated glycosaminoglycans ± triamcinolone acetonide in carpal joints of horses with induced carpal chip fractures. The treated horses were run on a treadmill for two minutes trotting, then two minutes at maximum gallop, followed by another two minutes of trotting every day. This exercise regimen was intended to mimic similar stresses on the joints when compared with horses in training but was controlled so as to discount differences in training techniques and track surfaces which would cause discrepancies in the results. At the end of each week the horses were trotted up and assessed by a clinician who was blinded as to which joints were treated and what drugs were used. I found it very interesting to witness the experimental design of long-term studies investigating drug efficacy and found it enlightening to see how the researchers implemented a study protocol that would discount as many multifactorial effects of degenerative joint disease as possible.

There are four main areas of current research interest at the Orthopaedic Research Centre, the first of which involves investigations into novel methods of joint tissue healing. Current research in this field involves the use of equine mesenchymal stem cells and its effects on tendon and ligament injuries as well as promoting chondrogenesis within arthritic joints. Similarly, research has recently finished which delves into gene therapy vectors that use bone marrow-derived mesenchymal stem cells to accelerate bone and cartilage healing in horses. Also in this area of interest is the use of A-Cell (acellular porcine urinary bladder matrix) for the treatment of superficial digital flexor tendon injuries, to which this novel therapy is advocated.

The second area of interest is the early diagnosis of bone and joint disease. Within this field, there has been development of a wireless gait analysis system for the investigation of lameness as well the development of an in-shoe pressure measurement system as an alternative method of kinematic analysis. Aside from biomechanical research in this field, there has been further research into accurate assessment of MR images of the equine distal limb and also investigation into early markers of joint disease, such as collagenase antibody assays and blood tests to identify alterations in skeletal tissue turnover.

The third area of interest involves the improvement of understanding the pathogenesis of exercise-induced traumatic disease. Current research involves the investigation of race track surfaces and the effect of track maintenance on the mechanical properties of the surface. Long term studies involve the assessment of changes in the fetlock joint of horses over time, the development and validation of a musculoskeletal model of the equine fetlock joint, and the influence of early exercise on cartilaginous changes within the fetlock joint.

The fourth area of interest investigates the efficacy of manipulative and integrative therapies and rehabilitation techniques in horses, many of which are related to back pain and the nociceptive thresholds of the axial skeleton of the horse. The centre recently was granted funding for a study to evaluate the physiologic and biomechanical effects of underwater treadmill exercise on experimental osteoarthritis in horses.

Overall, my time spent at the Orthopaedic Research Centre opened my eyes to the diversity of research in such a specific area of veterinary medicine, notably equine performance-related injuries and degenerative joint disease. I also learned a great deal about

'Good Lab Practice' techniques and experimental design of research protocols. Witnessing the vast amount of quality research conducted at the Centre has re-ignited my passion to contribute to the field of equine orthopaedic research.

However, I also have a passion for equine surgery; especially orthopaedic surgery, which was why I also devoted some of my time to visit the University's James L. Voss Veterinary Teaching Hospital. At the hospital, I was allowed to join the final year equine surgery rotation. Each morning started with rounds where cases were presented to the group and a discussion as to the appropriate therapy and treatment regimen commenced. I was allowed to admit cases and see them through to discharge and was fully integrated into the management of cases. At the teaching hospital I was given the opportunity to practice ultrasounding the flexor tendons and suspensory ligaments of the distal limb as well as perform nerve blocks, ranging from palmar digital nerve blocks all the way up to median and ulnar nerve blocks. I was also allowed to sedate the horses for procedures and place catheters and endotracheal tubes when horses were admitted to surgery. I found everyone very helpful and am indebted to the clinicians who helped me earn such valuable practical experience.

One thing to note, which I found very interesting, was the case population for the clinic. The majority were Quarterhorses, however I saw quite a few Foxtrotters, Tennessee Walkers, and even a mule. These are breeds that are not common in the UK and I found it very helpful to see the types orthopaedic problems associated with these breeds which may differ from the thoroughbreds and warmbloods so common to Britain. What I learned from the diversity of breeds is that horses are horses no matter what discipline, and the approach and treatment of cases is quite similar in the end. However, it was very enlightening to learn about the different riding disciplines from discussions with clients and greatly enhanced my communication skills and knowledge of equestrian sports.

Although I spent a brief two weeks at Colorado State University, in such a short time I greatly increased my knowledge of equestrian sports and performance horse medicine and improved my clinical and communication skills. I am indebted to BEVA for allowing me this wonderful opportunity and I feel my time spent at the Orthopaedic Research Centre and Veterinary Teaching Hospital was probably the most beneficial learning experience of my burgeoning equine career.