It has been said that to properly raise a child “it takes a village,” but Lorna Burgess will tell you that it definitely “takes a community” to save a badly injured horse. Her two-year-old Thoroughbred filly, Erin, is proof of that. It is also proof that – sometimes – with owners willing to take a risk, a knowledgeable team of veterinary professionals, and a strong-willed, spirited horse, some tragedies can have happy endings.

In November 2006, Lorna and Adrian Burgess had recently moved to Colorado, when they were struck with the kind of catastrophic, life-threatening injury that can make horse owners cringe. “Erin was just running in the pasture with her playmate when she suddenly fell. We saw it happen and ran out right away and slowly walked her back to the barn,” said Lorna. It was evident her injury was serious. Their veterinarian in Norwood, Colorado, Dr. Mark Vandenburg, determined after an exam and x-rays that Erin had a serious carpal fracture and severe soft tissue damage surrounding the knee. After a consult with another Western Slope equine veterinarian, it was determined the treatment options were limited. They decided to get the x-rays to the Colorado State University Veterinary Medical Center for equine surgeon Dr. Laurie Goodrich and surgery resident Dr. Ryan Carpenter to evaluate for potential fracture repair. They agreed the surgery could be done with the chance for a good outcome, but the sooner the better.

Transporting a severely injured horse for a 12-hour drive over several mountain passes at the end of November is not something Lorna Burgess would ever want to do again. However, at the time, it was something she felt compelled to do for Erin.

Once at the hospital, Drs. Goodrich and Carpenter had the important task of explaining everything to Lorna from what they saw on the x-rays, the surgical procedure, the risks involved during and after (continued on page 2)
Welcome

Dear Friends,

Welcome to our holiday, 2007 version of the Equine Hospital Newsletter. In this issue, we have tackled a couple of difficult topics, namely support limb laminitis and fracture repair. These are always controversial topics but ones that we often face with horses at the hospital. We would also like to introduce you to our farrier, Dr. Shawn Olson. Shawn brings a unique perspective to our lameness cases since he is trained both as a farrier and as a veterinarian. I hope you find the information valuable, and as always, give us a call if you have any questions.

This fall, our hospital is undergoing some much-needed upgrades. New countertops and cabinets have been installed in our outpatient and surgery suites with new sinks and flooring in our surgery scrub room yet to come. In addition, the asphalt in our lameness area has been replaced to create a more even surface to evaluate lame horses. Our surgery induction and recovery stalls will also get a facelift with new foam padding placed on the walls. All of these renovations will improve the appearance of our hospital as well as improve the standard of care that we can provide to your horses.

Our new hospital director, Dr. Dan Smeak, began his job in August and is getting to know his way around the hospital. Dr. Smeak is in charge of both small and large animal hospital operations, so if you have any suggestions on ways to improve our equine program and provide the best possible service to our clients and referring veterinarians, please forward them to us. We appreciate your input.

All of us at the hospital wish you a “Happy Holiday” and we look forward to working with you and your horses in the new year.

Best Regards,
Dr. Gary Baxter
Chief, Equine Hospital Section

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A Happy Ending, continued from page 1

surgery, what recovery would look like, and the cost of all this.

“The radiographs showed a severely comminuted ulnar carpal bone fracture with instability at the joint, meaning there were multiple fractures, bone fragments in the joint with a lot of effusion, and soft tissue swelling,” says Dr. Laurie Goodrich, faculty clinician on Erin’s case. “This was an uncommon fracture, but Erin was a good candidate for this surgery because she was young, active, and healthy and demonstrated a tough, strong-willed personality,” said Dr. Goodrich.

The plan was to arthrodese (surgically fuse bones across a joint space) the knee using a new Locking Compression Plate system (see “Innovative Bone Plating System” on page 5). After the plating was complete, a bone graft harvested from Erin’s sternum was put in the site to aid healing. Antibiotic impregnated beads were placed alongside each compression plate to control infection, prior to closing the incision. A full limb cast was applied from just below the elbow joint to include and completely encase the hoof. Erin recovered from anesthesia beautifully with no complications.

“Colic, laminitis, and infection are some of our biggest worries in such cases,” Dr. Goodrich points out. Colic can develop when the horse’s gastrointestinal system has to slow down; for example, during anesthesia for surgery or as a post surgical pain response. To prevent support limb laminitis (see “Support Limb Laminitis” on page 5), the patient must be kept confined and quiet, on its feet with weight evenly distributed. This is when the farrier, Dr. Shawn Olson, works his magic (see “A Farrier’s Role” on page 4).

Erin did very well in the days following surgery. After a little more than two months under the care of the equine surgical team consisting of doctors, residents, nurses, students, and barn crew, Erin appeared to be walking well with only a slight mechanical lameness. Feisty filly that she is, she was quickly learning to compensate for her stiff gate by slightly flexing her hoof at the fetlock joint.

“She was doing so well that we felt comfortable discharging her with instructions for 120 days of stall rest with hand walking 5-10 minutes, twice a day as the healing progressed,” Dr. Goodrich explained. “Dr. Vandenburg and Dr. Carrie Taylor have conducted regular examinations, which include radiographs, to continue to assess recovery and monitor for any weaknesses or injury. Their expertise in Erin’s aftercare has been exemplary.”

Erin has gradually been returning to the antics typical of a Thoroughbred filly always ready for frolicking and getting into trouble. According to Lorna Burgess, Erin’s favorite pastime these days is dumping her 15-gallon water trough and whinnying encouragement to her playmates in the paddock.
Eye on Clinical Research

Gene Therapy in Fracture Healing

Dr. Carpenter, under the direction of Dr. Laurie Goodrich and collaborators Drs. Frisbie, Kisiday and McIlwraith, is evaluating a gene therapy technique that involves using a viral vector (adenovirus) to transport and express a protein (BMP 2 and 7), which plays a vital role in bone healing. Following the initial bench top laboratory study, this method will be evaluated in a splint bone fracture model in the horse that will give us first-hand knowledge of how this gene therapy technique will accelerate fracture healing in the horse. While this gene therapy technique is still in the research and development stage, there are a large variety of exciting areas that could be used in the clinical case. Whether a complicated fracture case like Barbaro or this filly Erin with the fractured carpus, the possibilities are endless.

The locking compression plate system is a relatively new innovation in equine orthopedic surgery, primarily fracture repair, and healing. Currently, Dr. Carpenter is working on a case report involving a horse, Erin, that had a major fracture of the carpus (knee) that was repaired using the locking compression plate system.

The locking compression plate system is a relatively new innovation in equine orthopedic surgery, and it has been exciting to utilize this system on a variety of other cases at CSU.

Tendonitis; Interlesional Therapies

Dr. Ty Wallis recently completed a project for his master’s degree evaluating the use of a commercially available acellular urinary bladder matrix (ACell Vet Powder®, UBM) in treating tendonitis. The project was carried out with Dr. Gary Baxter and with collaboration and support from the Orthopaedic Research Center (ORC) at CSU and used a collagenase-induced tendonitis as the experimental model.

Tendonitis, or “bowed tendon,” is a common problem in athletic horses and represents a substantial reason for retirement, particularly in horses worked at speed. The most common area for tendonitis to occur is in the mid-cannon region of the superficial digital flexor tendon, presumably due to its relatively small cross-sectional area in that location compared to the forces it withstands during hyperextension of the fetlock at high speeds. Even after these lesions heal, horses commonly reinjure the tendon at or very near the previous scar.

There have been many different therapies proposed to hasten healing and provide a more structurally sound tendon, and many are being investigated in controlled studies. Much of the current research focuses on intra-lesional therapies, which can be injected into the damaged area of the tendon and augment the normal healing process. UBM has been shown in at least one clinical case series to provide improved healing and a faster return to work than rest and rehabilitation of the tendon by more conventional techniques. In our experimental model, however, there was no significant difference seen in the rate or degree of healing between tendons treated with UBM and those treated with a negative control.

CSU plans to continue to pursue more effective intra-lesional therapies for treating tendonitis. Dr. Dave Frisbie and other researchers at the ORC, along with support from Dr. Baxter, are currently planning a project to evaluate the efficacy of bone marrow-derived stem cells and fat-derived stem cells in a similar collagenase model.

Oxidative Stress in Veterinary Medicine

It seems that everywhere you look today there is something about antioxidants, whether it is in supplements you can buy for your animals (or yourself) or even on your bottle of iced tea. The great interest in antioxidants is in stopping or limiting oxidative stress, but what is oxidative stress—and why does it matter? Oxidative stress refers to the cellular injury that occurs when there is an imbalance between oxidants and antioxidants within a living organism, and has been implicated in numerous disease processes ranging from sepsis to Alzheimer’s disease in human medicine. The evaluation of oxidative stress in the horse has been limited primarily to ischemia-reperfusion injury (strangulating lesions) of the gastrointestinal tract, recurrent airway obstruction (heaves), exercise, arthritis, and pituitary pars intermedia dysfunction (Cushing’s disease).

Oxidative stress has been a very active field of research in human medicine, particularly exploring its role in the progression of critical illness through the systemic inflammatory response syndrome and multiorgan dysfunction, with the ultimate goal being the development of antioxidant therapies to try and reduce morbidity and mortality. However, even with all of the research to date, the results are mixed at best.

Dr. Carl Soffler

The current body of knowledge of oxidative stress in horses and much of veterinary medicine is still quite limited and in the early stages of research. Dr. Carl Soffler, a third-year intern in the equine critical care section, are currently working on two studies to establish better ways to assess oxidative stress and potential antioxidant therapy in horses. The first is a study to validate different tests for the measurement of urinary isoprostanes (a biomarker of oxidative stress) in veterinary species. The validation is a stepping-stone to future research to permit easier and more accurate assessment of oxidative stress in our animal patients. The second study is to develop an experimental model to reliably induce oxidative stress in horses. Once the model is established, it can be utilized to scientifically evaluate the efficacy of different antioxidant therapies. Although much of the current work is preliminary, there is great hope that it will lead to further studies to better characterize oxidative stress in our equine patients. These studies are expected to be completed by the spring of 2008.
The Farrier’s Role in the Prevention of Support Limb Laminitis

Dr. Shawn Olson is no stranger to the Colorado State University Veterinary Medical Center. Yes, he has been providing specialized farrier services to the patients in The Equine Hospital for three years but he also received his Doctor of Veterinary Medicine here in May 2001. “Combining Dr. Olson’s science background and his shoeing experience of seventeen years make him an incredible asset to our equine program”, said Dr. Gary Baxter.

In Erin’s case (see related story on page 1), Drs. Goodrich, Carpenter and Olson planned to apply a working foot support system that helped relieve some of the weight-bearing burden from the healthy limb. The hope was to allow Erin to stand and move with her weight evenly distributed. The full limb cast made Erin’s fractured leg longer than her healthy one. That meant that the foot system on the healthy hoof needed to not only pad the sole but make the leg the appropriate height to stand level.

Dental impression material was used to pack the inside of the hoof to support the frog and fill the sole which permits more of an even weight distribution. Next is the pad to cover the impression material followed by the block of supporting material which added the necessary height to the healthy leg. The system was carefully aligned and successfully attached and remained in place until the cast was eventually removed.

Once out of the cast Erin continued to require specialty shoeing. “You have to remember that the foot in the cast is going to be smaller for some time due to having been completely incased, while the opposite foot is going to be larger from carrying a little more weight,” Shawn said.

Other challenges for Shawn in Erin’s case were the fact that she was young and had never been shod and post arthrodesis she had no bend in her carpus. So, for this little filly, getting her first pair of shoes was quite an event.

Equine Veterinarian Participates in International Education Shuttle to Mongolia

Dr. Ann Davidson, one of the Colorado State University equine field service clinicians, recently returned from a remote veterinary service shuttle to the South Gobi Desert in Mongolia. She was part of a team of veterinarians working with Christian Veterinary Mission in Mongolia. The goal of the shuttle was to provide continuing education and hands-on training to the local Mongolian veterinarians working in remote areas. The horse and the camel are two of the most utilized and revered animals in the country as they are so important to the Mongolian’s way of life.

The first part of the shuttle was spent with a team of veterinarians from Mongolia, the United States, and New Zealand who put on a camel medicine conference in the South Gobi. Then, they traveled to different provinces in Mongolia to provide veterinary continuing education on equine and livestock diseases. It was quite a privilege and unique experience to be able to work alongside the Mongolian veterinarians and to learn about their way of life and veterinary practice.
Innovative Bone Plating System
Improves Outcomes for Equine Orthopedic Procedures

Successfully repairing an equine fracture involves so much more than just surgical fixation of the injury. In addition to the threat of infection, colic, and potentially fatal laminitis, most of the fixation devices available to veterinarians have been designed specifically for people and often don’t fully meet the needs of the non-human patient. Human fractures, for example, are more easily controlled: The fracture forces are considerably less, and it is easier to limit the amount of weight bearing on the injured limb postoperatively.

The unique locking compression plate fixation system (LCPS) used to repair Erin’s fracture (see story on page 1) was originally developed for long-bone breaks in human patients, and the device recently made the transition to veterinary medicine. Thanks to the system’s stability and strength in holding together badly shattered bones, it is proving to be an invaluable fracture repair for the equine athlete. Dr. Laurie Goodrich, equine surgeon at CSU’s Veterinary Medical Center, believes this system will revolutionize fracture repair in the horse. Animals with injuries previously thought to be beyond repair now may have a surgical option and recoveries with fewer complications.

The LCPS is composed of a stainless steel and titanium plate and screw device that uses a new locking screw technology with the standard plating techniques surgeons have previously used. This blending of old and new technology gives the surgeon the ability to use the familiar techniques improved by a more secure method of fixing the screw and plate to the bone.

Where the traditional bicortical screw method compressed the plate to the bone using friction between the plate and bone to maintain stability, the new locking screw system provides more strength and stability to the fracture because of several features. The screw head is recessed and facilitates a more fixed connection with the plate because it actually locks via threads in the plate. The core diameter of the screw is larger, making it less likely to bend or shear. The screw will be less likely to back out over time, diminishing the need for later surgical intervention.

Support Limb Laminitis: A Potential Complication in Equine Fracture Repair

Support limb laminitis is a condition that we see as a result of prolonged extra weight-bearing on a single limb. This can occur due to a severe lameness in one leg which causes the horse to bear most of its weight on the opposite front or rear limb. In our hospital we see this as a complication of fracture repair or a severe injury to one leg. It seems more common in the front limbs but can occur in the rear as well. We do not know the exact cause as it appears to be different than the more classic form of laminitis (founder) seen in horses that over-eat grain or consume too much lush pasture. For some reason the extra weight bearing changes the blood flow to the foot and causes inflammation in the foot tissues leading to movement of the coffin bone within the hoof wall. Horses develop severe lameness in their good leg which makes management of these cases very difficult since they already have a major problem in the opposite limb. Many of these horses have to be euthanized because they do not have a “good leg to stand on” so to speak. Prevention is the key as once support limb laminitis develops; it is very difficult to stop or reverse. Unfortunately, we cannot seem to prevent this from occurring in all cases.

Preventing support limb laminitis involves several steps:
1. Getting the horse more comfortable on its injured leg such as stabilizing the fracture or treating the cause for the severe lameness.
2. Controlling the pain with medications such as phenylbutazone or other types of NSAID’s so the horse bears more weight on its injured limb.
3. Corrective trimming and shoeing on the good foot such as is illustrated in the article on page 4. Long toes can predispose to laminitis so we will shorten the toe and attempt to make the horse bear most of its weight in the back part of the foot. This can be done with specific types of padding on the foot or special shoes applied to the foot.
4. Minimizing concussion on the good foot by having the horses stand in sand or other types of soft bedding.
5. Careful monitoring of the good foot for any signs of problems.
6. Medications and drugs do not seem to be effective in preventing or treating most cases of support limb laminitis.
Annette McCoy

Dr. Annette McCoy, a 2006 graduate of Michigan State University, started her equine surgery residency at Colorado State University. Dr. McCoy is interested in soft tissue surgery and developmental orthopedic disease, as well as non-steroidal anti-inflammatory drug therapy in horses.

Dr. McCoy moved around growing up, although she considers Kansas her home state. After graduating from Michigan State, she completed a large animal internship at the University of Minnesota. She rotated through all of the large animal service sections, including surgery, medicine, reproduction, and anesthesia, during her internship but placed special emphasis on equine surgery and lameness. She also was able to pursue her interests in teaching and public education.

Dr. McCoy and her husband, Jeff, enjoy hiking and biking in the mountains. In her spare time, Dr. McCoy also enjoys reading and watching movies.

Dr. Sonya Wilsterman

Dr. Sonya Wilsterman is a first-year resident in Equine Internal Medicine. She graduated from the UC Davis School of Veterinary Medicine in 2006. She spent the following year in a rotating internship at the San Luis Rey Equine Hospital in southern California. During her internship year, she honed her clinical skills in the treatment of a variety of equine maladies, ranging from gastrointestinal emergencies to the treatment and care of critically ill neonates.

As a first-year resident Dr. Wilsterman works closely with senior faculty to diagnose and treat horses with infectious or chronic diseases. She is also responsible for the clinical training of fourth-year PVM students, a task in which she takes great pleasure. Dr. Wilsterman also spends much of her time on the Emergency and Critical Care service where she sees everything from colicky horses to limb lacerations. She enjoys emergency surgery (even if it is in the middle of the night) and hopes to continue doing surgery after her residency.

Dr. Wilsterman is a California native and a great lover of the outdoors. She is an avid cyclist and has completed several long distance road races. She is currently training for a marathon in February and hopes to compete in triathlons next spring.

Polly Webb

Polly Webb grew up in Maryland and fell in love with horses at summer camp, as well as watching the movie, “The Man from Snowy River.” She rode and studied English riding for 10 years, with a focus on dressage and jumping. She worked as a wrangler in Estes Park for three summers leading trail rides into Rocky Mountain National Park. After finishing a BA in Latin American Dance and Music History, and moving to Colorado in 1997, she returned to the animal world and received a degree in Veterinary Technology in 2004. Following school she worked at the Animal Medical Center of Estes Park, as well as Alameda East Veterinary Hospital in Denver. Realizing she missed and felt more connected to the equine world, Polly started working for the Equine Section at CSU in March of this year, in the Equine Medicine / Emergency and Critical Care Service. She will be helping the Foal Care Team and Neonatal Intensive Care Unit (NICU).

In addition, Polly brings with her six years of equine massage experience. She was certified in Equine Sports Massage in February 2001. Polly believes in conjunctive therapy and works closely with veterinarians, believing massage is not a replacement for veterinary care, but part of a team-oriented, parallel approach.

“It is a noble thing to help creatures as magnificent as the horse.”
– Sun Tsu
Colorado State University – The Equine Hospital

Gifts to the Equine Hospital at Colorado State University’s Veterinary Teaching Hospital are used to support clinical care through equipment purchases, enhance the Professional Veterinary Medical Program for our students, provide funding for clinical research programs, and provide discretionary funds to the Equine Hospital section head that are used where most needed. If you would like to make a donation in support of the Equine Hospital’s needs and goals, please complete the form below and return with your gift. If you have any questions on making a donation to the Equine Hospital, please contact Courtney Comer, Associate Director of Development for the College of Veterinary Medicine and Biomedical Sciences at courtney.comer@colostate.edu or at (970) 297-4278. Online giving also is available at https://advancing.colostate.edu/EquineHospital/give.

Enclosed is my/our check for a gift of $ _________________
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Wish List for the Equine Hospital

Listed here are items both large and small that will enhance our ability to provide quality care for our equine patients and help instruct our senior veterinary students.

If you are interested in making a donation to fund any of this equipment, call Dr. Gary Baxter, Equine Section Head, at (970) 297-0382, e-mail gary.baxter@colostate.edu; or Courtney Comer, Associate Director of Development for the College of Veterinary Medicine and Biomedical Sciences, at (970) 221-4278, e-mail courtney.comer@colostate.edu.

Large Animal Rescue Glide Equipment
Function: To assist with the movement of horses that are down and cannot get up from neurological disease or trauma. It will help when getting them out of a trailer, to the stall area, or even just rolling them to the opposite side.
Estimated cost: $1,000

Surgical Air Drill
Function: This compact air drill is needed to complement our new surgical locking plate system the Equine Hospital recently received through our clients’ generous donations. This system will aid in greater efficiency in fracture stabilization.
Estimated cost: $13,750

Flushing Pump for the Olympus Endoscope
Function: During an endoscopy procedure, this pump will enable us to have a continuous stream of water to rinse tissue for better visualization.
Estimated cost: $1,500

Kangaroo ePUMP Enteral Feeding Pump
Function: To help meet our critically ill neonates’ nutritional needs. With this feeding pump, we can administer a continuous rate of nutrition throughout the day as opposed to giving intermittent boluses of milk, which can be difficult for new stomachs to handle. This pump is easy to program, delivers accurate doses, and has features that ensure patient safety.
Estimated cost: $900

Support an Equine Resident
Function: To educate and train equine specialists of the future. Donations will be earmarked for equine surgery and medicine residents during their three-year specialty training program, specifically towards professional development, conference attendance, and off-site visits.
Estimated cost: All donations are accepted.

Other Items of Interest
Ophthalmoscope (for ambulatory service): $500
Stethoscopes for use on critical patients: 10 needed at $75 each
Happy Holidays from the Equine Section!