Equine Field Service Brings Critical Care to Mares and Foals

Sharon Gillette called the equine field service at Colorado State University’s Veterinary Teaching Hospital quite early that Saturday morning in April. She had carefully monitored her pregnant maiden mare, Inexcessively Royal, as the mare neared her due date. An experienced horsewoman, Sharon knew the potential for problems with maiden mares, and it now appeared that her fears were coming true.

Dr. Ann Davidson, one of three equine field service clinicians at the hospital, took Sharon’s urgent call about her mare and newly born foal. Quickly grabbing some hi-gamma plasma from the pharmacy freezer and two senior veterinary students, Davidson, team, and the well-stocked field service truck were on the road in minutes.

“My primary concerns were the foal’s physical condition and the status of the mare’s colostrum,” Dr. Davidson explained. “At birth a foal has a non-functioning immune system; immunity comes through the mare’s colostrum or ‘first milk.’” For the first 24 hours of life, a foal’s intestinal system is highly absorbent, allowing antibodies in the colostrum — immunoglobulin G (IgG) — to be quickly pulled into the bloodstream. A foal that cannot get enough good quality colostrum — either because the mare cannot produce it, or the foal cannot nurse — is at risk for serious problems including diarrhea, pneumonia, infected joints, an infected umbilicus, or septicemia (a systemic bacterial infection). This is known as failure of passive transfer (FPT).

“The time to treatment is crucial for a successful outcome,” says Dr. Davidson. Sharon Gillette’s foal had been unable to nurse for almost eight hours, because Inexcessively Royal was uncomfortable with the foal approaching and the foal displayed mild characteristics of a “dummy” foal, unable to find the mare’s teat and grasp it strongly enough to suckle. Dr. Davidson performed a SNAP test to verify the need for a plasma transfusion. The test is a quick and easy screen for measuring IgG levels in foals’ blood serum that can be done at the farm. By placing a few drops of the foal’s blood in a hand-held device, a range of IgG level can be estimated in only seven minutes.

Sharon’s foal tested so low it didn’t register, indicating that plasma was needed, (continued on page 5)
CSU’s Equine Hospital Is Well Prepared for Foaling Season

For most people, December means shopping, planning, and holiday preparation. For horse owners expecting a foal, and for CSU’s equine hospital staff, “planning” and “preparation” have an entirely different meaning.

“We start preparing for foaling season months in advance,” says Polly Webb, CVT and nurse coordinator for the Neonatal Intensive Care Unit (NICU). “That means evaluating and stocking appropriate equipment and holding training sessions for the hospital emergency team. That team consists of three groups of veterinary professionals. The obstetrics team, led by theriogenologist Dr. Pat McCue from the Equine Reproduction Lab, the Emergency/Critical Care service with equine surgeons Drs. Eileen Hackett and Diana Hassel, and the Equine Medicine group, Drs. Gabriel Landolt, Lutz Goehring, and Jen MacLeay, to care for the neonate prior to and post foaling. In addition to the equine hospital nursing staff and residents from the medicine and surgery services, other members of the foaling team include anesthesiologists, in case the mare must be anesthetized for foal delivery and laboratory technicians that evaluate patient blood work if necessary.

“We want everyone on the same page with everything in place so that when a patient hits the door, we think and react quickly and smoothly. For a mare in dystocia or a neonate just born, minutes are crucial,” states Dr. Hackett.

“A number of problems can cause dystocia,” says Dr. Eileen Hackett, Equine Surgeon and Equine Emergency and Critical Care specialist. “An abnormal presentation in the birth canal, an unusually large foal, or a physical or anatomical problem with the mare are some of the issues that may create problems in the birth process.”

A mare with dystocia must be treated quickly but carefully to avoid injury to the reproductive tract or to the foal. Sometimes the veterinarian can resolve problems in the field. Other times, a well-trained hospital team is best equipped to save mare and foal.

Hospital protocol for handling a dystocia begins with a call that a mare is having a difficult delivery and the owner or their veterinarian is sending them to the hospital. And so the process begins of notifying all personnel and setting up all necessary equipment.

“Depending on the foal’s status, the mare’s condition and the cause, dystocia can be handled in different ways,” Dr. Hackett explains. “Clinicians must quickly assess all three to determine what happens next. If the foal is alive and the dystocia can be corrected by assisted vaginal delivery, the team...” (continued on page 5)
CSU Veterinary Hospital Pharmacy: A Vital Resource

With almost 40 years of experience between them, registered pharmacists Rick Allen, Paula Morgan, and Charleen Becker represent that powerful backbench you want on your team any time, but especially when treating sick, injured, or critically-ill horses. Other members of the pharmacy team include Anna Scinto, pharmacy technician, and several volunteers.

“We rely on their knowledge and expertise. They not only dispense medicines and compound special drugs that are patient specific, but they also provide that last critical review before a medication is dispensed. That assures that the appropriate medication is being prescribed in the appropriate dose for that species,” says Krista Dickinson, CVT and equine nursing specialist.

Professionalism and attention to detail aren’t the only characteristics shared by the pharmacy team; another is that between them, they have eleven horses. “Owning horses gives us added insight to what our hospital patients and clients need,” says Paula Morgan. “We stay ahead of the curve on new medicines, changed protocols, and drugs that are no longer available or only in limited quantities. Some unavailable drugs we can compound ourselves, as needed.”

The pharmacy at the Veterinary Teaching Hospital is always busy, providing services for hospitalized patients in the small, large, and exotic animal sections and outpatients, as well. Working with a variety of species requires more than just a broad scope of pharmaceutical knowledge, but also an in-depth knowledge of therapeutics, law, and the compounding of drugs.

Pharmacists who work in Veterinary Referral Centers graduate from a professional degree program and complete a requirement for a number of internship hours before qualifying to take the pharmacy national exam. After passing the exam, they are registered pharmacists and receive licensure in the state where they practice.

Rick, Paula, and Charleen received their Bachelor of Science in Pharmacy degrees from the University of Colorado’s School of Pharmacy, a five-year program, and are registered in the state of Colorado.

To maintain licensure, they fulfill annual continuing education requirements.

“We keep up with changes in pharmaceutical protocols, vaccine protocols, new drugs under review, and new human medications applicable to veterinary medicine,” Rick Allen explains. “To provide the kind of quality care demanded by a modern veterinary hospital and our knowledgeable clients, we have to stay current.”

The pharmacy team maintains memberships in nationally recognized professional organizations, attends national conferences, and also networks with other veterinary teaching hospitals at veterinary colleges throughout North America.

In addition to pharmacy responsibilities, Rick teaches a class for junior veterinary students that includes prescription writing, antibiotic use, and pharmaceutical calculations among other things. Each year, the pharmacy department also produces the official CSU Formulary, a list of pharmaceuticals, doses, and current drug information that is a very important reference for hospital clinicians, students, and outside veterinarians.

The pharmacists are also skilled in preparing special nutritional support for very sick patients. These mixtures are tailored to the needs of the individual patient whether foal or adult, and are prepared and packaged by hand, under aseptic conditions in the pharmacy.

“We work with the clinician to create the right combination of nutrients, based on a variety of factors,” Charleen Becker explains. “The preparation contains proteins, carbohydrates, multivitamins, and fats, but in appropriate proportions for the needs of that specific patient.”

The primary goal of the hospital staff is returning a patient to good health. Each horse that comes to the CSU Equine Hospital is considered to be unique and, as such, treatments, medications, and therapies are tailored specifically to the patient, not just the injury or disease. Working together, the pharmacy and hospital staff assure every equine patient at CSU the very best care.

From left to right: Pharmacists Paula Morgan, Rick Allen, Char Becker, with pharmacy tech Anna Scinto in the middle.
Equine Clinician Receives National Institute of Health Grant

Dr. Laurie Goodrich

How do you make the cells of the joints heal damaged cartilage and prevent osteoarthritis? Growth factors are known to help joint tissues such as cartilage and the synovium (inner lining of the joint) important in helping heal cartilage injuries) regenerate damaged tissue to aid in the healing process and prevent the occurrence of osteoarthritis. When the joint tissue is damaged, growth factors are low and eventually rise over time; however, the levels in joint tissues are not adequate and often damaged tissues do not heal, which results in osteoarthritis.

Dr. Laurie Goodrich received a five-year grant from the National Institutes of Health to study how gene therapy may provide a solution to inadequate levels of growth factors. By using an inactivated virus that does not harm cells but can gain entrance into cells, DNA that encodes for important growth factors will be delivered to cells to result in high levels of therapeutic proteins that will encourage cartilage to heal. This method of treatment of joint disease is called gene therapy and is a growing field that appears to hold much promise for treating many different types of diseases including musculoskeletal diseases.

As part of the NIH grant, Dr. Goodrich will learn how to construct viral vectors and first study tissues in culture. As progress is made, the research will advance to the application of gene therapy in the horse model and clinical trials will ensue.

Dr. Goodrich is working closely with mentors and collaborators, Dr. Wayne McIlwraith at CSU and Dr. Jude Samulski at the University of North Carolina. Other CSU collaborators include Dr. Hari Iyers and Dr. Ken Reardon, who will help Dr. Goodrich study the other beneficial proteins that are released in gene therapy through microarray analysis (gene chips) and proteomics. In taking this “global” analysis, Dr. Goodrich hopes to discover other crucial proteins and growth factors that are integral to healing cartilage. The overall goal to the research is to have a gene therapy program that can treat damaged cartilage and result in regeneration of healthy tissue and return of equine athletes to their pre-injury performance level.

Top Ten Reasons to Consider Colorado State for Your Horse Care

1. The equine section of the James L. Voss Veterinary Teaching Hospital is a state-of-the-art facility that provides complete care for your equine companion.
2. We have an indoor lameness work up area to perform lameness and pre-purchase exams.
3. We offer group discounts for boarding stables from our Equine Field Service.
4. We’re available 24/7 for in-hospital and field service emergencies.
5. We have around the clock care for all in-hospital patients.
6. CSU has surgery, medicine, and critical care specialty-trained equine veterinarians.
7. We have in-house farrier services or we can consult with your personal farrier.
8. We offer complimentary therapy including acupuncture, manipulative therapy, and massage.
9. Our advanced treatments including shockwave, stem cells, and IRAP.
10. Referrals are not necessary for us to evaluate your horse.
as well as antibiotics to protect against infection. The plasma worked wonders for the foal. A little later, the mare received a mild sedative to allow the foal to approach and suckle. The bond between mother and baby could now begin.

Returning Monday for a re-check, Dr. Davidson was happy to see the mare acting like a proud and fiercely protective mother, while her little colt nursed enthusiastically. Another SNAP test showed IgG levels still a little low, between 400-800 mg/dl and a liter of plasma was given, which brought the level above 800 mg/dl.

“Even with a textbook-smooth birth, a foal’s immunoglobulin levels should be checked within 12 hours after birth to assure antibodies are being absorbed,” said Dr. Davidson. “I prefer an eight hour check, which allows time to correct low levels. Better to treat right away – easily done in the field – than wait and possibly have to transport a critically ill foal to the hospital.

As the picture on page 1 shows, mare and foal are doing great after a slow start. Sharon Gillette states, “He wouldn’t be alive today if it weren’t for Dr. Davidson and the field service team’s early morning visit.”

What do the Colorado State University equine section and the Loveland Fire and Special Operations Team have in common? A lot, as they may both get called to rescue a large animal in distress. With that distressed animal comes an owner or other individuals, trying to help the animal. Regardless of the incident, it has been found that 83 percent of owners say, given no other choice, they would risk their lives to save their animals. “To ignore large animal rescue creates a high likelihood of a rescue involving both a large animal and untrained rescuers,” said Cy Pollema, a lieutenant with the Loveland Special Ops Team.

Recently both groups have participated in technical large animal rescue trainings and will continue joint training exercises through the summer. “Each group can do what they do best; veterinary professionals take care of the animal and firefighters handle the technical rescue piece and keep people safe. Now we are both on the same page at a scene,” says Dr. Ann Davidson, CSU Equine Field Service veterinarian.

A sedated horse is “packaged” for safe movement on a glide (see Wish List).

Dr. Ann Davidson administers plasma in the field.

Foaling Season, continued from page 2

will pull the foal either by correcting its position with the mare standing, or under general anesthesia with the hindquarters elevated. A cesarean delivery under general anesthesia is necessary if the foal cannot be delivered vaginally.

Once delivered, an assessment is made as to the well being of the foal and what, if any, additional interventions are necessary. Often these foals are compromised due to an extended birth, needing additional treatment such as oxygen and fluid therapy. The foal’s vitals are monitored along with their ability to stand and nurse.

Over the next 24 to 48 hours, the NICU will carefully watch mare and foal for post-partum complications. Along with doctors and nurses, a group of veterinary student “foal care” volunteers spend three-hour shifts through the night sitting with their small charges. They help keep fluid and oxygen lines untangled, keep new babies in a semi-sternal position, and assist nursing staff and senior veterinary students to feed and clean their patients. “We really appreciate the extra hands our volunteers provide through the night,” states Polly Webb, NICU Coordinator.

Preparation and practice prior to foaling season pay off when the equine team at the Colorado State University Veterinary Teaching Hospital is ready to provide high quality emergency care for a critically-ill neonate or the mare in dystocia at a moment’s notice.
**Staff**

**Fran Lewis, Large Animal Receptionist**

Fran Lewis grew up in the “Sweet South” (a.k.a., Georgia). She moved to Colorado with her partner in 2006, after graduating from the University of Georgia with a degree in creative writing. During college she worked at the UGA Veterinary Teaching Hospital, with the anesthesia department, so it was an easy transition joining the staff at the Colorado State University James L. Voss Veterinary Teaching Hospital. She got her first horse when she was 12 years old from her grandparents and still enjoys riding today. Fran is currently a member of the volunteer foal care team at the hospital. She is passionate about animal welfare and cares deeply about not only the hospital patients, but also about meeting the owner’s needs.

**Goodbyes**

After four years it’s time to say goodbye to Dr. Jolynn Joyce. She is headed back to her home state, Texas, and will be missed. She completed her surgical residency in ’07 and stayed a year in an emergency surgery position. Dr. Ty Wallis has also completed his surgical residency and will be moving to Tennessee and Oklahoma. Dr. Carl Soffler, equine medicine resident, successfully passed his specialty boards and will be finishing his residency work here in July. He can’t seem to get enough of academics and is staying to pursue a PhD. The field service unit is saying good-bye to Dr. Tawna Purcell, a graduate of CSU veterinary school who stayed on a year to work with the ambulatory section. Julie Roselle, lab coordinator and equine nurse, is leaving to attend “human” nursing school. She will be missed by all.

**Welcome**

First, a big welcome to Mason Cole (8 lbs. 13ozs.), born March 29, 2008, to Kimberly and Todd Alexander and big sister Gracelyn. Kimberly is an equine surgical nurse and will be back with us again starting in mid June. Congrats!

New staff include medicine resident Jennifer Sonis who received her DVM from Louisiana State University in ’07 and presently is doing an internship in an equine practice in California. The surgery resident is Kathryn Amend who graduated from Washington State University in ’07 and is currently an intern at a progressive equine private practice. Another ’07 Washington State graduate, Dr. Ryan Ferris, will be the new equine reproductive resident as Dr. Erica Gee is finishing that residency and returning to her faculty position at Massey University in New Zealand. Dr. Fausto Bellezzo has been hired as a clinician in Equine Surgery, Lameness and Emergency/Critical Care. Originally from Brazil, he did a large animal surgical residency at Tufts University and trained clinically at Louisiana State University. Dr. Bellezzo has been faculty at Iowa State University in Equine Emergency Surgery and has most recently spent two years in an equine private referral practice in California.

**Equine Behavior**

The weekend of March 14, 2008 Dr. Jennifer MacLeay was one of the presenters at the Rocky Mountain Horse Expo in Denver, Colorado. Dr. MacLeay is one of three internal medicine clinicians in the equine section of the Colorado State University James L. Voss Veterinary Teaching Hospital. Dr. MacLeay has a strong interest in teaching safe horse handling techniques and equine behavior.

**Check In and Check Out All in One Place**

We are making an effort to ensure our hospital is a bit more user friendly for you, our equine clients. Now the large animal reception desk is the place to go, not only for check in, but check out and bill payment as well. Our hope is to expedite your check out and keep you with the large animal staff, folks you have already met and work with regularly. Please let us know if this has been an improvement of our service to you.

Dr. MacLeay did three demonstrations with her horse, Reigna, on how horses learn and the scientific basis underlying natural horsemanship techniques. The demonstrations were very well received. Dr. MacLeay plans to do similar presentations at next year’s Rocky Mountain Horse Expo as well.

Dr. MacLeay is also preparing a course for veterinary students on safe horse handling and behavior that she is co-teaching with Teri Sprague, a Pat Parelli 3-star endorsed instructor from Berthoud, Colorado. If you have behavior issues with your horse and would like to consult with Dr. MacLeay, please give her a call at (970) 297-4471.
**Eye on Clinical Research**

**Alternative Therapeutic Targets for EIV and EHV-1**

Dr. Gisela Soboll and Dr. Gabrielle Landolt were awarded $100,000 for equine viral respiratory disease research from the Grayson-Jockey Club Research Foundation. Equine influenza virus (EIV) and equine herpesvirus-1 (EHV-1) are the primary causes of viral respiratory disease in horses and infection with these pathogens may result in serious illness and potential death. The viruses’ substantial impact on equine health is highlighted by the increasing frequency of reports of outbreaks of EHV-1 associated neurological disease as well as the severe influenza outbreaks in Japan and Australia in 2007. These examples clearly demonstrate that EIV and EHV remain a worldwide problem and serve to illustrate the limitations of currently used vaccines.

The Grayson-Jockey Club Research Foundation award provides funding to continue research toward elucidating the immune responses triggered in the respiratory tract subsequent to infection with EIV and EHV-1. The long-term objective of Drs. Soboll and Landolt’s research is to offer alternative therapeutic targets, such as antivirals and immune modulators, to prevent initial infection and control disease.

**Sand Colic Prevention Study**

Consumption of sand and dirt in horses is a common and important cause of morbidity and mortality in horses. Presence of sand within the intestinal tract can cause chronic diarrhea, weight loss, and colic as a consequence of irritation and obstruction in the gastrointestinal tract. Sand impaction also predisposes the horse to volvulus or displacement of the colon. Supplementing feed with psyllium is often recommended to prevent and treat sand accumulation, although there is no known clinical trial to substantiate this claim. In a recent pilot study with eight horses, Dr. Diana Hassel demonstrated that a nutritional supplement combining probiotics, prebiotics and psyllium (Assure/Assure Plus, Equine Research Associates, Fort Collins, Colorado, USA) significantly increased fecal sand output in clinically normal horses in their natural environment. Fecal sand output increased 2.7-fold over baseline values by day 4 of supplementation and remained increased through day 31 of the feeding trial. Our goal with the current study is to perform a similar trial, but with horses with known accumulations of sand in their GI tract that is evident via x-ray examination of their abdomen. We will treat one-half of these horses with a small amount of grain plus supplement for 34 days, and one-half will serve as controls, receiving only grain without probiotics, prebiotics and psyllium. We will monitor their sand output with fecal analysis every 3 days along with follow-up radiographs at the end of the study to determine whether sand was cleared effectively. This study will give us insight into the effectiveness of this unique product in the clearance of accumulated sand in horses with a known sand load.

**Oxygenation in Surgical Colic Patients**

Horses with colic represent a significant portion of our emergency surgical caseload. There is evidence, mostly anecdotal, that many of these colic patients have poor oxygenation (low oxygen in the blood) while under anesthesia, but there have been no controlled studies proving this. Dr. Annette McCoy, under the direction of Dr. Eileen Hackett and collaborators Drs. Hendrickson, Wagner, and Mama, has begun a study aimed at determining not only if colic patients have worse oxygenation under anesthesia than do healthy patients undergoing elective surgery, but also if this poor oxygenation leads to post-operative complications. The project will utilize data from arterial blood gas samples taken from horses undergoing emergency colic surgery as well as from horses undergoing elective procedures under general anesthesia. Based on this data, two important measures of gas exchange (the ability of the body to move oxygen from the lungs into the blood) will be calculated, and these will be compared to factors like breed, age, gender, duration of colic signs, and type of intestinal lesion. The results of this research will hopefully allow early identification of horses at risk for poor oxygenation under anesthesia as well as those at risk for post-operative complications.

**Grayson Jockey Club Foundation Grant Enables Continued EHV-1 Study**

Equine herpesvirus-1 (EHV-1) is the frequent cause for a common cold in horses. However, this virus can cause abortions in late-term mares under the right circumstances, and is also connected with a neurological syndrome that primarily affects the spinal cord of horses. This specific disease occurs under ‘outbreak conditions,’ which means that a large number of horses on a farm experiences fevers and signs of a common cold; however, only a fraction of the infected horses will develop neurological signs.

We have already shown that neurological disease associated with EHV-1 is more likely to occur during winter and early spring. Also it is more common in horses older than three years of age in Thoroughbred and Warmblood breeds. We are not sure what happens during the interaction between the virus-transporting cell and the endothelial cell, which is part of a blood vessel. The award from the Grayson Jockey Club Foundation will enable us to continue studies in progress looking at the interaction of EHV-1 infected lymphocytes with endothelial cells in the horse. These are all in vitro studies. Dr. Lutz Goehring and associates want to find out which factors enable the virus to enter vascular cells of a horse, and to develop strategies to block this cellular infection to prevent neurological disease from occurring.
Wish List for the Equine Hospital

Listed below 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) 491-2351, 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 compliment 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

Kangaroo ePUMP Enteral Feeding Pump

*Function:* To assist with meeting 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 particular pump is easy to program, delivers accurate doses, and has many 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

Air mattress for equine anesthetic recovery – $5,000

Ophthalmoscope – $500

(for ambulatory service)