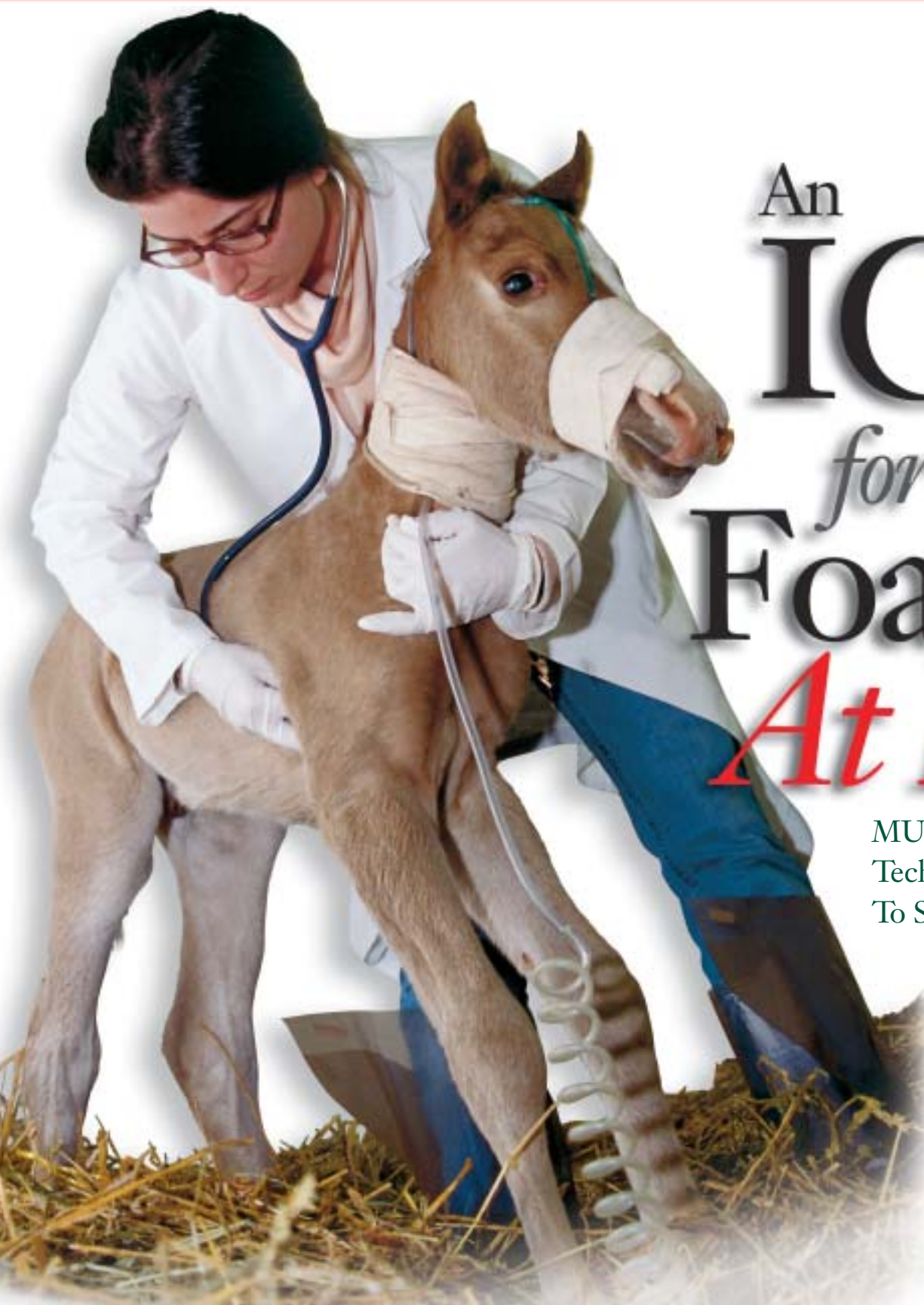


Arkeology

SPRING-SUMMER 2003 News and trends on veterinary medicine and the human-animal bond.



An ICU for Foals At Risk

Our Mission

Because animals are more important today than ever before in our history, the MU College of Veterinary Medicine is dedicated to preserving, protecting, and strengthening the human-animal bond. *Arkeology*, as its name implies, is a medium for bridging between the role of the College as a protector of the animal kingdom (a kind of modern ark) and as a place where science, medicine, learning, and teaching can flourish (*logia* is the old Latin and Greek word for study or discipline). Continuously embarking on voyages of teaching, healing, and discovery, the College invites you on board this vessel to journey with us.

MU's Equine Neonatal Unit Mixes High-Tech Medicine And Old-Fashioned Care To Save Newborn Horses

Jane Ebben remembers Jigsaw. Born prematurely, the paint colt had most everything going against him. He was dehydrated, had low blood sugar and oxygen, and did not receive immunoglobulins from his mother, increasing the risk of infection. His intestinal tract was a tangled mess, leaving his bladder near the bursting point. Consequently, he couldn't be fed, even with a stomach tube. He had a range of infections, the worst in his leg joints. Unable to breathe or stand, he required constant nasal oxygen. Only hours old, he celebrated life with an emergency surgery to counter the infections.

Jigsaw may have been unlucky physically, but the location of his birth was inspired. He was born near the Equine Neonatal Unit of the College of Veterinary Medicine, University of Missouri-Columbia. Here, specialized care, and veteran veterinary technicians like Ms. Ebben, are available to provide the specialized form of veterinary medicine that the foal needed.

A Place For Foals in Trouble

The sight of the newborn foal warms everyone's heart. With big eyes, an inquisitive expression, fuzzy ears, and soft nose, they're all legs and curiosity. Their first attempts to stand and nurse are awkward—their legs get in the way and their noses end up on everything before they find the source of milk. Soon, these gangly, uncoordinated newborns turn into graceful foals with an abundance of energy; frolicking and playful.

Foals can be the most fragile of babies. Their vital organs develop only just before birth. Born premature, nothing works. They have very little energy reserves and poorly-developed immunity against infectious agents in the environment. They are prone to infections, low body temperature, low blood sugar, and low blood oxygen. Sometimes, their rapidly developing nervous system makes it difficult for them to keep their body systems in balance—any slight deviation can set them up for serious problems. Unlike adult horses, that have large physiolog-

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Dr. Nicole Scotty, veterinarian in the MU College of Veterinary Medicine's Equine Clinic, examines a quarter horse nicknamed Bob Dylan by hospital staff. Only minutes old, Bob Dylan suffered from seizures, infections, and intestinal problems. After four weeks of care at the clinic, the horse went home with his Columbia, Mo. owners.

P R E V I E W S

Taking a Technological Leap

Imaging technology has made great strides in the past decade, allowing clinicians and scientists to use medical techniques that are less invasive. The MU College of Veterinary Medicine is undertaking an effort to become the Midwest's, if not the country's, premiere veterinary imaging center.

A Greyhound's Story

As Daffy grew, he not only couldn't run, but could hardly walk because of a bone deformity. Animal lovers from across the country pitched in to help the brown-eyed dog, resulting in a ground-breaking surgical procedure.

On to Greener Pastures

The MU College of Veterinary Medicine's mule mascots are successful public relations professionals. This spring, they hung up their horseshoes and retired to greener pastures.

Pets, Not Pills

Why study the human-animal bond? Because it promises to open new avenues of healthcare that are a pleasure to experience. It gives Dr. Richard Meadows "warm fuzzies" on a regular basis.

COMMENTARY: DR. JOE N. KORNEGAY

Venita (center) with friends and their dogs in Malaysia.



Animals Are Special The World Over

This issue of Arkeology contains stories recounting the special place that animals have in our lives. Our animals provide us with companionship and so much more. Who could help but be moved by the irrepressible spirit of Jigsaw, the foal born with two strikes against him, or Daffy, the greyhound who simply wouldn't quit? These stories offer encouragement to all of us as we face daily challenges.

Dr. Meadows' column reminds us of the remarkable powers of the human-animal bond, and through his reference to the work of Dr. Johannes Odendaal of South Africa, the global reach of this relationship.

We live in an increasingly smaller world. I have been reminded of this over the past few months through two separate trips to Japan and Malaysia. During the trip to

Japan, I presented a series of lectures to veterinarians. These veterinarians, through a translator or with English that far surpasses my primitive Japanese, often described challenging cases requiring advanced medical care and an emotional and financial commitment by the owner.

I was particularly impressed by one case in which the required care and emotional commitment merged ... a case in which the veterinarian was also the owner. The dog, a miniature Dachshund named "Vier," developed hydrocephalus (water on the brain) that required surgical intervention. Surgery was done and Vier's neurological function improved. But, he ultimately succumbed to complications arising from an unrelated condition. I was touched as the veterinarian/owner described the dog's plight and the obvious bond that existed between them. A bond that extended beyond Vier's life here on earth.

My trip to Malaysia completed a three-year term as the External Examiner for their veterinary school. Malaysian veterinary graduates have traditionally entered government service or worked with companies tied to their swine and poultry industries. However, while interacting with their students over the past three years, I was struck by their increasing interest in companion animals.

This year, fully half of their students related to me that they planned to enter small animal practice upon graduation. A similar trend has been seen in other countries, where people have turned to animals for support, as the challenges faced in everyday life have become more complicated.

I recall, in particular, a conversation with a bright Malaysian student, Venita. Flashing an infectious smile, she told me of her family, including two dogs named Scott and Heidi. Venita went on to say that she'd always had animals and hoped to enter either small animal or equine practice. Regardless of where life takes her, I'm convinced that Venita will be a credit to the veterinary profession.

Yes, our love for animals and a desire to serve them are universal emotions that remind us of how much we have in common with our fellow citizens of the world. **Ark**

Dr. Joe N. Kornegay, Dean, College of Veterinary Medicine



Looking To Take a Leap Into Imaging Technology

MU CVM Is Seeking Funding For New Technology To Aid in Teaching, Research, and Clinical Missions

When Clydesdale Hall opened a decade ago, its imaging equipment was state-of-the-art. Ten years, however, is a technological eternity. Today, that same equipment is nearing obsolescence with parts hard to obtain. Moreover, new modalities, like magnetic resonance imaging (MRI), have revolutionized medicine. Life-threatening diseases can often be diagnosed and treated using non-invasive imaging, in many cases eliminating the need for more risky surgical procedures.

Given the University of Missouri College of Veterinary Medicine's missions of providing the best education to the next generation of veterinarians, the highest quality referral clinical service, and latest technical support to scientists who call the university home, updating the imaging capability has become a high priority. Over the past ten years, the college has gradually upgraded equipment as priorities were identified. Rather than continuing this approach, the college is seeking to create a modern Imaging Center in the heart of the Veterinary Medical Teaching Hospital. This center will have equipment and procedures rivaling that of a modern human hospital.

The Imaging Center will be unique in veterinary medicine. "This comprehensive Imaging Center would be the only one of its kind in the Midwest," says Dr. Jim Lattimer, associate professor at the MU Veterinary Medical Teaching Hospital and head of its imaging section. "This would make MU a premiere institution in the area and provide immense benefits in our three missions of teaching, service, and research."

New Ways To Teach, Discover, and Heal

Advancements in non-invasive imaging have led to dramatic changes in both clinical service and research, Dr. Lattimer says. "Virtually all major medical cases, as well as many minor ones, require imaging as part of the diagnostic work-up. Moreover, new imaging procedures have spurred improved treatments in internal medicine, neurology, and surgery that often have eliminated the need for invasive diagnostic procedures such as exploratory surgery, minimizing patient stress and discomfort."

One such procedure is called interventional imaging. Here, imaging helps eliminate the need for surgery by using fluoroscopy to guide a catheter inserted through a vein or artery to a point where medicines or medical devices can be delivered directly to the disease process. Another new imaging procedure uses ultrasound or CT (computed tomography) scanning to guide biopsy of deeply rooted tumors or to evacuate cysts in difficult to approach areas such as the brain.

The key device in the Imaging Center would be an MRI. Magnetic resonance imaging uses a magnetic field and radio waves that are pulsed into tissues. The resulting images provide detail of a millimeter or less, giving doctors a clear view of soft tissue. As diseased tissue reacts differently from normal tissue, the radiologist can more quickly ascertain potential problems.

"Modern MRI's are so sensitive that we can detect changes earlier than with a CT in some cases," Dr. Lattimer explains. "So if tissues are abnormal, we can often detect it—even if it's not large enough to create a noticeable change on radiographs. Magnetic resonance spectroscopy can also be used to evaluate the biochemical composition of tissue. For example, it can measure neurotransmitter levels and chemical shifts in the brain, detecting things as sensitive as myelin damage. This biochemical analysis is particularly effective in cancer cases but is perhaps even more important in evaluating seizure disorders."

Exposing each veterinary medical student to the most accurate methods of seeing and



Ultrasound, using sound waves to detect disease in the same way that sonar detects submarines, can provide exceptional image quality in a variety of applications including cardiac care.

measuring disease is critical to developing their very best diagnostic and treatment skills, Dr. Lattimer says. "As fast as technology is developing, many of today's high-tech devices could become commonplace in community veterinary practices of the future. Certainly, the digital generation which allows images to be recorded, stored, and displayed is rapidly coming and we need to be ready for it."

These new tools will also help equine and food animal medicine specialists better serve Missouri's animal agriculture industry. Scientists studying cancer, orthopedic, and eye problems will have better ways to gauge the effectiveness of new treatments. This would advance new treatment procedures while at the same time conserving animal resources, time, and money. The center will serve not only the college's research efforts, but those of the entire university and beyond.

Funding The Imaging Center

The college is seeking to establish a perpetual endowment for the Imaging Center, and this is going to be a challenge. Once the endowment is in place, Dr. Lattimer says, client and service fees would pay for operation expenses, technician salaries, and maintenance.

Funding for this project will probably come from one or a few major donors, says Park Bay, director of development at the college. Mr. Bay is looking for individuals or organizations who could fund an endowment to support the center.

"Private giving has traditionally ensured the margin of excellence required to keep our teaching hospital at the forefront of clinical care," Mr. Bay points out. "Private giving helped build the teaching hospital and supports many of the nationally-renowned programs housed within it. We have an opportunity here for the MU College of Veterinary Medicine to 'leapfrog' into a new area of teaching, service to the community, and research capability that will make

our college among the best on the globe."

Using the interest from the endowment as collateral, the college could seek loans to accelerate the purchase of new equipment.

"This college, throughout its history, has been blessed with friends and partners who have appeared at critical moments to help the college take its next step," Mr. Bay remarks.

"Clydesdale Hall itself is a testament to that. Someone, perhaps a person seeking a legacy in making a difference in animal health care, may be waiting to join with us on this project. I would love to see this center named for such a friend. That, for me, would make this a win-win situation for everyone." **Ark**



X-ray angiography helps diagnose diseases of the blood vessels of the body, including the brain and heart. Traditionally, angiography is used to diagnose pathology of these vessels such as blockage caused by plaque build up. Recently, radiologists, cardiologists, and vascular surgeons have used angiography to guide minimally invasive surgery of the blood vessels and arteries of the heart.



Dr. James "Jimi" Cook, center, is a veterinary orthopedic surgeon who received the American Veterinary Research Society's New Investigator Recognition Award at the Society's annual meeting. He and his co-investigators are studying how the dog's condition is inherited.

D A F F Y B E F O R E . . .

When Daffy arrived at the MU Veterinary Medical Teaching Hospital, he was in pain, arthritic, and could barely walk due to the severe curvature of his front legs.

Mending the Greyhound

Daffy's Malformed Legs Made It Look Like He Would Always Be Crippled, Until His Visit to the MU College of Veterinary Medicine

Greyhounds love to run. Their long powerful legs and lithe, streamlined bodies make them natural athletes. Even as puppies, they practice bursts of speed for the sheer joy of it.

Daffy, born on a farm near Kansas City, loved to run like his littermates. But while his brothers and sisters zoomed faster, Daffy seemed to become more clumsy. As he grew into adolescence, the problem became worse. He could only walk, and then only in pain, while his fellow greyhounds exercised their need for velocity.

Something bad had happened to Daffy's front legs early in his life. As he grew, the front legs became more deformed. His legs became so misshapen and angled that he walked as if he had "duck feet." Nearing his first birthday, Daffy was virtually crippled with a rare bone deformity that appeared inoperable. Typically, such animals face euthanasia. But, Daffy's large brown eyes and uncomplaining manner touched a series of people. In a span of a few months, they would mount a nationwide Internet campaign to gather funds for an orthopedic operation at the College of Veterinary Medicine, University of Missouri-Columbia. This procedure promised to give the greyhound a chance to do what he was never able to experience, a chance to run.

A Fascinating Medical Condition

Daffy's condition is called Angular Limb Deformity. Here, one of two bones in each of his forelegs grew at an abnormally slow rate. As one bone developed and the other didn't, Daffy's affected legs took on a strange, bent appearance.

In Daffy's case, the problem was a failure in the growth plate in the ulna bone, one of the two foreleg bones. Growth plates are responsible for bone growth and are located near the ends of the bones in young animals. The growth plates are softer than other regions of the bones and are in a dynamic state of activity, and therefore are more prone to injury. For greyhounds, most of the limb growth occurs from four to eight months of age. By approximately one year of age, the growth plates are functionally closed.

An injury to the plate during development can cause problems. Two things typically occur: a traumatic fall damages the growth plate or something interferes with nutrition to a section of the growth plate and its cartilaginous core that causes the bone growth to slow down or stop.

Bone deformation was Daffy's first problem. As his forelegs curved into the bow shape, the altered geometry forced him to walk on the sides of his front paws. This caused unusual stresses on his "wrists" and elbow joints that soon pulled out of alignment. This left Daffy lame and arthritic with painful stresses on his bones, joints, and soft tissues every time he walked.

Angular Limb Deformity is rare. Daffy's condition was very severe—among the worst that veterinarians who had examined him had seen—and potentially inoperable.

A Dog With Internet Friends

Under other circumstances, Daffy could have been euthanized. Born on a farm near Kansas City that specializes in greyhounds for racing, it was apparent that he would never compete.

Enter Jim Martin, a Tonganoxie, Kan. man who trains racing greyhounds for the Sky's the Limit

Kennels. Mr. Martin felt sorry for the clumsy dog and took him home. He contacted old friends at Greyhound Support of Kansas City who put Daffy's photo on the group's web page in hopes of finding him a permanent place to live.

It was on that web page that Kelly Graham in Cleveland, Ohio first saw Daffy. She remembered the skillful work on another greyhound by Dr. James (Jimi) Cook, veterinary orthopedic surgeon and assistant professor at the University of Missouri College of Veterinary Medicine's Veterinary Medical Teaching Hospital. She e-mailed Dr. Cook who looked at the case and agreed to perform surgery at a special price in order to help Daffy.

The Internet trail then led to Cara Brockhoff with Northcoast Greyhound Support, McKinnleyville, Calif. Northcoast is a fundraising company for greyhounds in trouble. Learning of Daffy's need, they scratched their heads for something new that might draw some attention and generate funds for Daffy's surgery. They decided to hold an Internet auction.

For seven days on Ebay, hundreds of people nationwide who had never met Daffy, beyond an image on a computer screen, bid on 65 items donated by Northcoast. There were 49 winners and \$1,675.92 was raised.

In Late August, 2002, Kansas City Greyhound Support volunteers made the two-hour drive to Columbia with Daffy.

A New Surgical Technique

Daffy's case presented all sorts of special problems to the surgical team at MU. The biggest challenge wasn't just in straightening the malformed foreleg bones, but in also restoring the proper alignment and correcting the longitudinal "twist" in the bones so



at the University of Missouri Veterinary Medical Teaching Hospital. He recently received the Orthopaedic Society's 2003 International Meeting in New Orleans. Dr. Cook was the first veterinarian to receive this prestigious award for his research on the degradation of a certain enzyme causes osteoarthritis in humans and dogs.

Dr. Cook Received the Orthopaedic Research Society's New Investigator Recognition Award for 2003



Before and after. An x-ray of Daffy's left leg before the operation and the same leg after the procedure with a bone plate to help keep the leg straight during its post-operative healing.



Daffy emerged from his surgical operation a changed greyhound. For the first time, he could walk normally and without pain, even though he had to wear thick bandages for a few weeks.

Greyhound Who Couldn't Run

that both limbs and all the joints were correctly aligned. Dr. Cook and the team had to change the direction of the ulna bone in three separate planes so that Daffy's legs would operate properly. This would remedy Daffy's pain when walking and reduce the possibility of arthritis developing later.

To accomplish this, Dr. Cook and colleague Dr. Derek Fox developed a new technique using a combination of a unique rotational osteotomy, temporary circular external fixators, and bone plates. In a two-and-one-half-hour operation, the surgical team initially placed an external circular fixator that was parallel to the abnormally aligned elbow and wrist joints on each foreleg. The two then carefully cut the radial and ulnar bones to correct the unwanted bowing, angulation, and rotation. Once these cuts were made, the rings of the fixator were aligned with one another using connecting bars, which aligned the joints and the limb in all three planes. Finally, a metal bone plate was placed on the radial bone to provide strength to the repair while Daffy healed, without impairing the function of the muscles and tendons.

Daffy spent almost three weeks in the MU teaching hospital recuperating. When he left to go home to Kansas City, he walked, in thick leg bandages, as he had never done before, like a normal greyhound.

Dr. Cook is director of MU's Comparative Orthopaedic Laboratory (COL), a special organization that features both human and veterinary medicine clinicians and researchers who collaborate to conduct orthopedic research, investigate joint diseases, and apply basic research to the clinical setting. It was initiated about three years ago by a pair of scientists and has grown to more than 25 active participants. Within the last year, the COL has collaborated with more than 20 scientists from eleven different laboratories.

This collaboration at MU shouldn't be surprising, given that the campus is one of the few that features colleges of veterinary medicine, nursing, human medicine, and engineering.

Dr. Cook, and colleague Dr. Keith Kenter, then at the MU School of Medicine, formed COL when both noticed that researchers in human and veterinary

medicine had something in common: they strive to solve some of the most puzzling mysteries of the ways bodies cope with disease and injury, and how they respond to treatments. Historically, veterinarians and physicians have worked independently to solve similar medical problems. However, in the last decade, there has been a growing trend toward comparative medicine, in which researchers from both camps combine their efforts. As a result, they are healing both people and animals more quickly and efficiently.

COL was the first such formal collaboration in Missouri and only the third of its kind in the nation.

The laboratory already has made impressive strides. In its short history, the doctors made quick progress toward something that has never been done before: regenerating connective tissue, the menisci, in the knee. They performed the first surgery of this kind on a dog, and are now working on Food and Drug Administration approval to restore human knee menisci.

"We are looking at the big picture," says Dr. Cook. "The more comprehensive, multispecies and multi-

disciplinary we can be, the better the chances are that we can come up with clinically applicable results. The dog is a great model for human applications, and we should take advantage of it."

Daffy Finds a Permanent Home And More

Jim Martin's original plan of finding a permanent home for Daffy was soon forgotten. Daffy had become too much a part of Mr. Martin's 10-acre farm, and an assortment of other critters, to go anywhere else.

Besides, Daffy had achieved a sort of fame, a success story of how committed animal lovers can overcome almost any obstacle.

Today, Daffy happily zooms around the farm, usually in formation with one or two other animals. He's become the unofficial mascot at the Woodlands Race Track in Kansas City, Kan., a place where greyhound athletes get to exercise their desire for speed. Racing fans come to meet the Internet dog who successfully overcame his problems. Not bad for a greyhound who came so late to running. **Ark**

A N D A F T E R

Today, Daffy enjoys running with his friends on a Kansas farm.



To Greener Pastures

An Early Retirement For Two Unlikely MU Employees, Missouri Mules

As public relations professionals go, they are a bit tall—and hairy. Their four legs, hooves, and insatiable appetite for carrots also set them somewhat apart from traditional PR types.

Nonetheless, the mascot mules of the College of Veterinary Medicine, University of Missouri-Columbia, have represented the college, MU, and the state of Missouri to thousands of people at numerous events since 1982. Pulling a dozen-passenger wagon, they've participated in MU's homecoming and the governor's inauguration parade. They were prominent in the St. Louis Charity Horse Show and American Royal Parade in Kansas City. The college's mules have also brought the governor to the Missouri State Fair's opening ceremonies, as well as performing yeoman duty at numerous city parades, picnics, weddings, and other events. Tens of thousands of Missouri kids have either ridden in the mule wagon or tempted the animals with peppermint or carrot treats. Often, the MU mules were the first farm animals that many city kids had ever seen in person.

The college's current pair of ambassadors, Jill and Shirley, have entered middle age and, in March, were retired to greener pastures. Both mules are developing an early form of arthritis that will make it difficult to regularly pull the large wooden wagon. The college is seeking a replacement pair.

An old friend of the mules, Dr. Justin Berger, MU DVM '98 and a past president of the MU Mule Club, agreed to let the mules enjoy their retirement days on his farm near Springfield, Mo.

The new mules will have large horseshoes to fill. The college's mules have been living Missouri history lessons, allowing people to learn about the mule's contributions to the state. In Missouri's first century, they were the backbone of the state's agriculture and economy. Once, Missouri exported more mules than any *country*.

Two Generations of MU Mules

The retiring mules are the college's second pair. The first mascots, Hilda and Louise, began work at the college in 1982, a generation after these animals passed from the state's everyday life. Hilda and Louise are a matched pair of sorrel draft mules, purchased as yearlings, trained, and raised by Howard Sartain of New Franklin, Mo. Hill's Pet Nutrition of Topeka, Kan. and Mrs. Virginia Etheridge of Columbia, Mo. funded the purchase of the team, harness, and wagon. After a decade and a half of service, they retired to the green pastures behind the college and a new generation of mules, Jill and Shirley, took their places.

Jill and Shirley were raised in Perry County by John Roy Chipman, a 1968 MU graduate. Bayer Pharmaceutical in Kansas City, under the direction of MU College of Veterinary Medicine alum Dr. Tom Lenz, DVM '75, purchased these mules for the college. Mrs. Etheridge helped in this project, too.

Both mules were show winners before coming to MU. "These are the two most vain mules," said Dr. Tanya Balaam, a MU veterinary medical graduate. "They know they are beautiful, as mules go." Both mules loved to stretch their honey-colored necks to invite crowds to stroke and pet them. "They, especially Jill, really know how to milk a crowd," a veterinary medical student said.

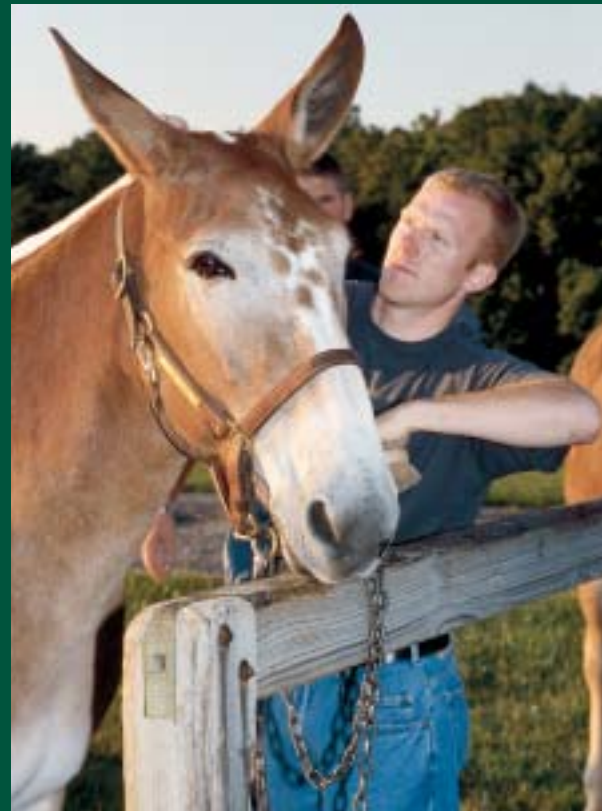
The mascot mules are tended by the college's Mule Club, about 20 or so veterinary medical stu-



The MU mascot mules are well known at events across the state, including many MU graduation ceremonies where the mules show up to give rides and greet visitors. Here, Mule Club advisor John Dodam, DVM, drives the mules outside MU's Memorial Union.



Nobody loved or knew more about the Missouri mule than Dr. Melvin Bradley, professor emeritus in MU animal science. His book on mules is considered a classic on the topic. Dr. Bradley passed away shortly after saying goodbye to Jill and Shirley.



How do you maintain mules? With old-fashioned skills and care that was once commonplace when these animals were staples of Missouri's economy. Today, these skills are kept alive by the MU College of Veterinary Medicine Mule Team with members like Michael Balke, Class of 2003.

dents who care for and exhibit the mules. These students are no strangers to hard work, but providing care for the mule wagon and maintenance for the related tack are hard and sometimes dirty, thankless tasks. For many events in the outlying parts of the state, the students arrive at the college's mule barn before dawn to feed and prepare the mules, load them into a truck, drive hours to an event, dress in hats and smiles, and meet the public with enthusiasm and patience.

The students have the opportunity to learn many things from being in the Mule Club. "Of course they learn about equine husbandry, and they learn how to hitch and drive a team of mules," says Dr. John Dodam, associate professor of veterinary medicine and surgery at MU Veterinary Medical Teaching Hospital and Mule Club advisor. "More importantly, they learn to work with one another to get a complicated task done. And they get the chance to interact with the public, teach them a little about history, mules, and the College of Veterinary Medicine.

They also get to see much of Missouri, and to meet the pet and livestock owners that they will be working for in a few short years."

Missouri and the Mule

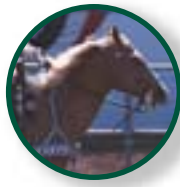
The humble mule, a hybrid offspring of a horse and jackass, occupies a noble part of the Missouri's heritage.

The state's first century relied heavily on the animals' ability to work hard and long and eat less than a horse. They were uniquely qualified to help early farmers pull stumps and plow the rocky and compacted Missouri soil. Mining companies alone used 12,000 of the animals.

Mules helped grow the young state by helping produce enough cotton and tobacco to trade overseas. They were an important part, too, of America's westward expansion. Mules were sold to the pioneers, tooted freight, and even pulled trains and riverboats.

Mule breeding became an important part of Missouri's early economy. In the late 1800s, when the

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Missouri has the third largest horse population, after Texas and California.



At a retirement party held for Jill and Shirley by the Mule Club, old and new friends got together. Mrs. Virginia Etheridge of Columbia, Mo., who was instrumental in helping the college obtain the mules along with Bayer Pharmaceutical of Kansas City, joined Dr. Justin Berger, MU DVM '98. Jill and Shirley will spend their retirement days on Dr. Berger's farm near Springfield, Mo.

average Missouri home had an income of less than \$700, a mule colt could sell for \$100, a major boost to a rural Missouri family.

At one time there were nearly a half-million mules in Missouri. They provided a substantial economic boost for the Missouri during wartime when small farms provided tens of thousands of the animals. During the Spanish-American war, the animal's ability to pack heavy loads across rugged terrain for long distances was highly prized. In World War I, there were more Missouri mules in the Army than mechanized vehicles. Mules were still used in World War II for use in remote areas, and were even parachuted into Burma where the terrain was too difficult for motorized transport.

The mule passed slowly from the state's agriculture. Even in the late 1940s, a farmer could still use a mule as a down payment on a John Deere tractor.

Looking For a Few Good Mules

The college is looking for its third generation of

MU mule ambassadors to carry on the tradition started by the first two pair. Not any mule qualifies. The ideal candidates should be a matched set to better pull the wagon as a team. They also need to be strong and physically mature. Above all, the team must be gentle and patient among the public, and ignore the distractions of zooming cars while they clomp down the street.

There are still places in the state where you can get a pair of big, draft mules, Dr. Dodam says. "However, we have to be pretty picky. We need a team that is physically able to hold up to the workload. But we need a team that is well broke and mentally sound. After all, we ask them to work in some pretty unusual situations."

Leading the effort to finance the mule purchase, estimated to be around \$16,000 to \$20,000 for a good matched pair, is the college's development officer Park Bay. As with the previous teams, the new MU mules will be purchased strictly through private donations. **Ark**

An ICU for Foals At Risk

■ continued from page 1

ical reserves, foals can deteriorate very rapidly if the post-partum events don't proceed as expected.

As Missouri's largest referral hospital for horses, the equine clinic at the MU Veterinary Medical Teaching Hospital can become a busy place for foals and other horses. Missouri is ranked third in the nation in horse ownership, following only Texas and California. At the clinic, about one-fifth of its patients are emergency cases.

Between 40 and 50 seriously ill foals wind up in the clinic each year. As they require specialized care, they go to a place just for baby horses, the equine neonatal intensive care unit (NICU).

"Neonatal emergency and critical care medicine are among the most intellectually challenging, technically demanding, and time consuming forms of medicine," says Dr. Philip Johnson, MU professor of equine medicine and surgery. "Medical care for neonates entails all aspects of the profession. If you are interested in healing, you cannot help but be interested in neonatal medicine. It challenges the practitioner to think, be very organized, and to be very observant. It doesn't get any more intellectual as you need excellent quality care decisions in very fast time for neonates—adult animals tend to be less critical."

Unique Threats, Unique Medicine

Foals come to the MU NICU for a variety of reasons including pneumonia; intestinal problems; neonatal maladjustment syndrome; inadequate immunity from failure to receive adequate colostrum antibodies; weakness from inadequate milk consumption; ruptured bladders; and joint, umbilical, and blood infections.

These foals receive treatment that would be familiar in a human emergency room, such as IV fluids, plasma transfusions, broad-spectrum antibiotics, oxygen therapy, and nutritional support. Foals who suffer severe anemia usually require transfusion of new cells or whole blood.

Like any ICU, neonatal medicine focuses on intensive treatment including oxygen delivery to tissues to minimize the effects of shock, Dr. Johnson says. It's critical, too, that tissue fluid and nutrient needs are met. If needed, drugs can be used for cardiovascular support, brain disorders, and problems with the foal's immune system caused by not receiving the mother's milk.

Some problems may occur even before birth in cases of difficult deliveries. Mares may simply require the repositioning of the foal prior to delivery. In more difficult births, clinicians may anesthetize the mare for an assisted delivery, or perform a caesarean section. Additional treatment may be required for retained fetal membranes, uterine infections, and laminitis. Mares with foals that are too weak to nurse must be milked by hand to provide nutrition for the foals.

The MU NICU is adjacent to the equine nurses' station. A window and television cameras help the professionals maintain close watch over their at-risk patients. The NICU is fastidiously clean for a horse stall—important in keeping infections at bay.

It isn't uncommon to see a baby horse draped in oxygen lines, nasogastric or intravenous feeding tubes, IV fluid support, and blood pressure probes. The NICU is steps away from the equine surgery suites if further intervention becomes necessary.

Other available equipment would be familiar to human neonatal medicine specialists, including pulse oximeters, automated fluid pumps, ECG monitoring equipment, and ultrasound devices.

Many private practice equine veterinarians refer their worst cases to the neonatal unit. It's the one place that can boast teams of specialists including board certified equine internists, surgeons, theriogenologists (reproductive specialists) and anesthesiologists, numerous graduate interns and residents in advanced training programs, outstanding veterinary medical students, and a highly skilled and trained technical staff.

High-Touch With High-Tech

Unlike critically ill adult horses who can be left to recuperate in a stall, neonatal patients must be watched constantly. "One good kick can knock off all of the IV and oxygen lines," says Ms. Ebben who has been providing equine neonatal medical care for 20 years. "You can't walk away even to go to the sink as a foal can fall down and break a leg. A fall can also cause scratches on the delicate cornea of the eye." Because medications, fluids, intranasal oxygen, and nutritional support are administered continuously, foals must be monitored constantly and kept upright



to guarantee adequate lung inflation.

With a severe case, faculty, staff, and students may not leave the teaching hospital until the foal is out of danger, with at least one, if not two or three, people with the foal at all times. Those involved mobilize to set up schedules to ensure ill foals can be constantly monitored. For many, this means hours in the stall.

There's a lot to look for on foal watch—some major medical conditions, and other subtle changes that often can only be seen by someone who has watched the foal for a long period. Petechial hemorrhages that slowly show up as little red dots on the foals' skin or eyes could indicate an emerging infection. Changes in skin color, mannerisms, alertness, and breathing rates may suggest improvement or that the foal is failing to respond to a treatment plan.

This hands-on care can be critical to the foal's survival. Sometimes, the subtle changes noticed by a student or other caregiver will provide important medical clues not revealed by the last laboratory test or examination.

"It's difficult not to bond with an animal with whom you have spent so much time and overcome so many difficulties," Ms. Ebben says. "Students will rally around these foals to help them make it. They will hug and kiss it to provide encouragement. The students take the foal to heart and will dedicate themselves to helping the foal."

Jigsaw Finds a Home

Jigsaw's recuperation was long and tortuous even after his surgery. Each medical problem was met and overcome with the appropriate high-tech or high-touch solution. Today, he is a healthy and happy horse with no indication of his early problems.

Ark

Prescribing Pets, Not Pills

We're just beginning to explore opportunities of the human-animal bond.

By Richard Meadows, DVM, DABVP (Canine and Feline Sections) • Director of The Center for the Study of Animal Wellness (CSAW)
College of Veterinary Medicine, University of Missouri-Columbia



Dr. Richard Meadows

Like many of my colleagues, I knew at an early age that I wanted to be a veterinarian. I've been practicing the profession for more than 20 years and I'm still like a kid in a candy store when I come to work at the University of Missouri Veterinary Medical Teaching Hospital. There are simply more opportunities to help than I can possibly take advantage of in addition to the important task of educating the next generation of veterinarians. It gives me "warm fuzzies" on a regular basis.

The opportunity with the most potential is the Human-Animal Interaction (HAI) studies conducted with my friend and research partner, Rebecca Johnson, PhD, RN. Dr. Johnson is the Associate Director for Research in our Center For the Study of Animal Wellness (CSAW) as well as MU's Millsap Professor of Gerontological Nursing at the Sinclair School of Nursing.

One important quality that Dr. Johnson brings to our HAI research is her irrepresible zeal. As an RN and a gerontologist, she has seen the need for medical, psychological, and social interventions that go beyond dealing with immediate illnesses and injury. She and I have both long felt that the unconditional love and acceptance from a companion animal can help prevent and/or treat a wide array of chronic, poorly responsive conditions. The evidence to support this belief is widespread and growing rapidly.

Why Study the Bond?

Some who are reading this may ask, "Why study the human-animal bond? Isn't it obvious that the bond between animals and humans is often deep, strong, emotional, and more often beneficial than detrimental?" They, like me, have witnessed that this bond goes beyond the affection shared between a child and a dog or to a senior citizen and a cat that sit together contentedly for hours at a time. They also know this bond can be seen in *all* sectors of society—the homeless person and his/her faithful dog, the autistic child who "opens up" and beams with happiness while riding a horse, the distraught owners who are told by their physician to "get rid" of their companion animals to avoid zoonotic (spread from animals to people) disease (despite little or no evidence of risk from that animal), the look of pride and accomplishment in the eyes of prisoners who learn to train horses, the worried face of a hard-working dairy farmer when one of his cows (all of

whom are named) is paralyzed by milk fever, and even in the mutual respect and nonverbal communication between a tough and leathery rancher and his favorite "cutting" horse.

It is apparent that there is much to learn and document and I've witnessed from a range of research projects that the "obvious" is not always true. If we are to utilize the interaction between humans and animals as "therapy," we need to better address many questions such as which animal(s), for what condition(s), how long to interact, how often, and when not to utilize animals.

Until we address these basic questions with well-designed, hypothesis-driven, replicated research we cannot expect full acceptance of animal-assisted therapy in the scientific community. Additionally, the studies addressing HAI must, and are beginning to, move from an entirely human centered view to a more comprehensive view that considers the effects of interaction on the animals.

Help From Around the World

Dr. Johnson and I could not conduct this research without the pioneering works of Dr. Johannes Odendaal and Dr. Jack Stephens.

Dr. Odendaal, a veterinary ethologist (behaviorist) and researcher in South Africa, is the first person to provide substantive scientific evidence regarding the physiological basis of positive (friendly) affiliation between dogs and people. What his unique study showed was that it is physiologically beneficial to *both* the animal and the person. He did this by examining several neurochemicals (chemicals active in the brain) that are positively changed by even brief, quiet, friendly interactions between dogs and people. He says, "Use the 'pharmacy' between your ears. It's free, legal, and natural." He has even created an information sheet that lists the dosages, side effects, and indications of using animals as a form of therapy similar to those found for any prescription drug.

Dr. Stephens is an invaluable MU CVM alumnus, as well as founder and CEO of Veterinary Pet Insurance and its VPI Skeeter Foundation in California. One of the main aims of the Skeeter Foundation is to help bring about the day when we prescribe pets, not pills. Much of CSAW's work would not be possible without the continuing support of Dr. Stephens.

Drs. Odendaal and Stephens also, like Dr. Johnson and I, look anxiously to a time when pets are prescribed as a part of "main stream" medicine. Some studies have already shown that people who have pets have decreased medical expenses and survive better/longer after a heart attack. More evidence such as this will hasten acceptance of animal assisted therapies by insurance providers as a safe, effective, and covered treatment modality. This, truly, will be an opportunity seized.

One of our human-animal interaction research projects looks at the beneficial changes occurring in the blood of both a human and a dog when the two happily and quietly interact. We are investigating a large panel of parameters in this study and we are also evaluating if the chemical changes are the same for a person visiting their own dog, another friendly dog, or a robot (artificial intelligence) dog. The signal we use to know when these changes have occurred is a drop in blood pressure in both participants.

In another study, we utilize trained visitation dogs to encourage disadvantaged senior people to start a walking program. In this study we'll evaluate the effects of this walking program on a number of indicators of these people's physical and psychological health.

The implications of these types of research projects are many. Will the elderly living in nursing homes require less medication because of the presence of a few puppies? Will cancer patients be routinely prescribed a cat to enhance the effectiveness of other treatments? **Ark**

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