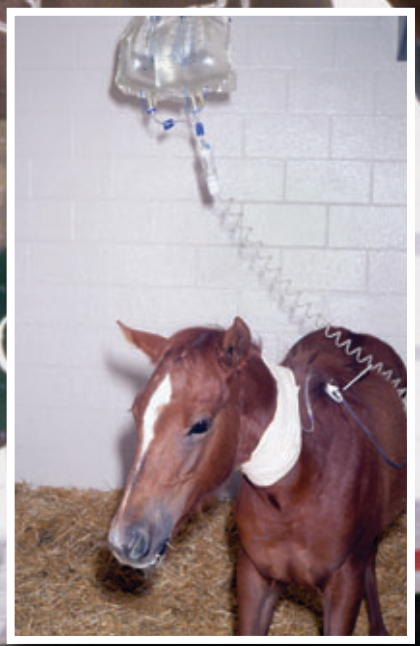
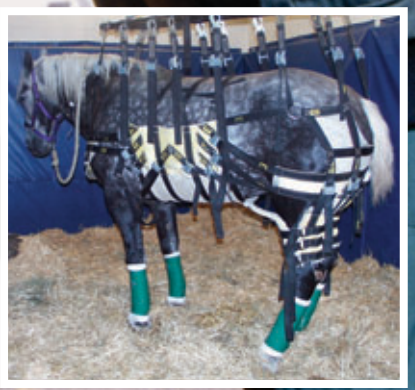
INSIGHT

Fall 2002

College of Veterinary Medicine and Biomedical Sciences





Colorado State University

Knowledge to Go Places

INSIGHT
Volume 29 Number 3
Fall 2002

College of Veterinary Medicine and Biomedical Sciences

On the cover:
Dr. Josie Traub-Dargatz, right, and large animal technician Kim Ellis administer the West Nile virus vaccine to a horse from the Colorado State University stables. The vaccine has been shown to be protective against the virus. Insets, left to right:
1. The West Nile virus vaccine.
2. A foal infected with West Nile receives intravenous fluids.
3. Cody, a draft horse owned by a senior PVM student, is supported with a body sling as he battles the effects of West Nile encephalitis.

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Welcome to *Insight*

Welcome to the Fall 2002 edition of *Insight*. In this edition, we take a look at two stories that have been in the news quite a bit this summer: West Nile virus and chronic wasting disease. Both of these devastating diseases are taking a toll on human and animal populations in Colorado and across the country, but at the College of Veterinary Medicine and Biomedical Sciences, researchers already are hard at work learning more about the basic biology of these diseases, creating new diagnostic tools, and developing potential vaccines.

In this edition, we also look at the growing fields of genomics, proteomics, and transgenics. The College continues to make major investments in new technology, increase support for our researchers, and facilitate the growing investigative programs that are at the cutting edge of each of these areas of study.

We also wish to send an invitation, along with this edition, to the dedication ceremonies for the new wing at the James L. Voss Veterinary Teaching Hospital and the Gail Holmes Equine Orthopaedic Research Center. You'll find more information inside about both of these exciting developments.

We hope you enjoy all the articles in this issue of *Insight* and we welcome your questions and comments. If you'd like to get in touch with us, please send your correspondence to:

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You can e-mail *Insight* comments to Paul Maffey, Director of Development for the College, at pmaffey@cvmbs.colostate.edu. We also invite you to visit us at our Web site at www.cvmbs.colostate.edu. ■

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Message from the Dean

Dear Friends,

I have been dean of the College of Veterinary Medicine and Biomedical Sciences for a little over a year now, and in that time, I simply cannot believe the changes that have taken place. I know that the College always has been a dynamic place staffed with visionary thinkers who embrace a "can-do" attitude, but I still am amazed at all that has been accomplished during the past 12 months.

Three major capital construction projects were started last year and, in November, we will celebrate the completion of two of these with dedication ceremonies. The new wing at the James L. Voss Veterinary Teaching Hospital and the Gail Holmes Equine Orthopaedic Research Center are nearly finished and ready for occupancy. The new wing will house several programs, including the Robert H. and Mary G. Flint Animal Cancer Center, the Argus Institute for Families and Veterinary Medicine, and the Shipley Natural Healing Center. You all are invited to attend the ceremonies and join us in the celebration.

We also completed the new stallion barn at the Foothills Research Campus this year, and work continues on the addition to the Microbiology Building, which will house research laboratories and the expanded Macromolecular Resources laboratory.

While all of these construction projects will enable the College to better meet the research and teaching demands of today and tomorrow, much more is yet to be done. To address that, we have begun the master site planning process for the College's south campus, including the Veterinary Teaching Hospital. We have had our first round of meetings with our architects, laid out our program goals, and will begin to see what we need to build to meet the future needs of the College. Although this process is very time-consuming – lots of meetings – it's also exciting to chart the future course of the College and visualize where we will be 25 years from now.

All of this growth and development does have a common denominator, and that is our faculty's commitment to helping society. We can see that demonstrated in this magazine, where we showcase work being done on chronic wasting disease and West Nile virus. We can see it in our focus on genomics and proteomics as we further these sciences to help us comprehend human and animal systems and develop the foundation of understanding that will one day lead to cures and treatments for the many diseases that afflict both. The expansion of the Animal Cancer Center will further enhance cancer research for both animals and their human owners. The new equine facility will promote research that may one day help treat and prevent orthopaedic diseases in not only horses, but transfer that knowledge to help people suffering from devastating medical conditions such as arthritis and osteoporosis. We also see our faculty's commitment to advancing society in the selection of the Colorado State Veterinary Diagnostic Laboratory by the United States Department of Agriculture as a core facility for the detection and surveillance of foreign animal diseases, important to protecting the food supply of our nation.

Dr. Lance Perryman

Of course, much of this important work would not be possible without the generous support of our friends and the hard work of our faculty, staff, and students. So many of you have given generously, and we appreciate the investment you are making in the College. We expect the dividends will be plentiful. Thank you. ■

With Best Wishes,

Lance E. Perryman, D.V.M., Ph.D.
Dean

West Nile Virus Continues March Across the Country

West Nile virus was first detected in North America in 1999 in New York. In 2000, after overwintering with host mosquitoes, the virus migrated south along the eastern seaboard, while in 2001, it began its march westward. This summer, outbreaks of the virus were reported in Texas, Nebraska, and other mid-western states. By mid-August, the virus made its presence known in Colorado with a large outbreak in horses in Weld County. By early October, 310 horses from 21 Colorado counties had confirmed cases of the virus and 42 horses had died. In addition, five cases of the disease in humans had been reported.

"We've been monitoring the steady westward progression of the virus, so the news that the virus has reached Colorado isn't surprising," said Dr. Lance Perryman, Dean of the College. "I think what is a bit surprising is how quickly the virus reached the western United States and that a disease that once was considered exotic now is firmly established in the Western Hemisphere."

As with other arboviruses, West Nile virus is spread through a bird-mosquito-bird cycle and transmitted to mammals, including humans, through the bite of an infected mosquito. Until recently, according to the Center for Disease Control in Atlanta, there had been no documented cases of person-to-person, animal-to-person, or animal-to-animal transmission of WNV. But in September, physicians and researchers were investigating the transmission of a number of West Nile cases in people who possibly were infected through blood transfusions and/or tissue transplants from infected donors. Many questions remain about the virus, but the following information highlights some of what we do know.

As with other arboviruses, West Nile virus is spread through a bird-mosquito-bird cycle and transmitted to mammals, including humans, through the bite of an infected mosquito.

A Primer on West Nile Virus (WNV)

What is West Nile virus?

West Nile virus is a mosquito-borne viral disease previously seen only in Africa, Asia, the Middle East, and southern Europe. The virus can cause encephalitis, an inflammation of the brain, or meningitis, an inflammation of the membrane surface of the brain and spinal cord in humans, horses, cats, dogs, and domestic and wild birds. It is closely related to St. Louis encephalitis, commonly found in the United States for years.

Where did WNV originate?

WNV first was isolated in an adult woman in the West Nile District of Uganda in 1937. The virus became recognized as a cause of severe human meningoencephalitis in elderly patients during an outbreak in Israel in 1957. Equine disease was first noted in the early 1960s in Egypt and France, in 1996 in Morocco, in 1998 in Italy, and appeared in 1999 in North America. Although it is not clear where the North American virus originated, the strain appears to be most closely related genetically to those found in the Middle East. It also is closely related to the St. Louis encephalitis virus commonly found in the United States. In 2000, 21 human cases of the virus were reported in the United States with two deaths. In 2002, as of mid-September, 2,000 people had been infected with the West Nile virus, and 98 people had died.

How is WNV spread?

WNV normally is spread by the bite of an infected mosquito. A mosquito will become infected by feeding on a bird that is carrying the virus. The virus recently has been found in the more aggressive Asian tiger mosquito, which is found mostly in the southern United States.

Do all mosquitoes carry West Nile virus?

No. Mosquitoes are a major insect pest problem in Colorado, but not all types of mosquitoes carry the virus. The principal transmitter of the virus is the *Culex pipiens*, or the northern house mosquito. Once the mosquito is infected, it can transmit the virus to people or other animals.

Can you get WNV directly from birds?

Currently, there is no evidence WNV can be spread directly from birds to people. However, to be safe, never handle a dead bird with bare hands. Use gloves to place dead birds in a plastic bag and then place the bag in an outdoor trash bin. If you want to report a dead crow, raven, or magpie, potential carriers of WNV, contact your local animal control agency or the Colorado Department of Public Health and Environment at (303) 692-2700 or visit the Web site at www.cdpe.state.co.us for instructions on how to submit a dead bird for testing.

What are the signs of WNV infections in people?

People with mild infections either have no signs or display signs of a mild illness such as headache, body ache, swollen lymph glands, a mild rash, and fever before fully recovering. Those with more severe infections may experience high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, and paralysis.

Who is most at risk?

Although anyone can get the virus, people over 50 years of age and those with compromised immune systems are in the highest risk group.

What is the treatment?

There is no specific treatment for West Nile viral infection. In more severe cases, hospitalization is recommended with intensive supportive therapy: intravenous fluids, airway management, and ventilator support if required. This also will help to prevent secondary infections, such as pneumonia.

If bitten by an infected mosquito, how long until symptoms appear?

Being bitten by an infected mosquito will not necessarily make an individual sick. If illness were to occur, it would begin to appear within three to 15 days of being bitten.

How is WNV diagnosed?

To diagnose a WNV infection, doctors must test either blood or cerebrospinal fluid from a spinal tap for antibodies to the virus. A second blood test is required two to three weeks later to confirm the diagnosis.

Is there a vaccine?

Currently, there is no vaccine for humans. In a recent congressional hearing, federal scientists reported a human vaccine could be available in three years.

West Nile Virus in Pets

Can dogs and cats become infected with WNV?

Yes. Dogs and cats can become infected the same way humans become infected – by the bite of infectious mosquitoes. It is possible that eating dead, infected animals such as birds, could infect dogs and cats, but this has not been proven.

Can infected dogs or cats transmit the virus to humans or to other animals?

No. There is no documented evidence that WNV can be transmitted by animal-to-animal or animal-to-human contact.

Should a dog or cat infected with WNV be euthanized?

There is no reason to destroy an animal because it has been infected with WNV. Full recovery is expected. Treatment should be supportive and consistent with standard veterinary practices for animals with a viral infection.

West Nile Virus in Horses

How do horses become infected with WNV?

Horses become infected the same way people do – by the bite of infected mosquitoes. The virus is located in the mosquito's salivary glands, and when the mosquito "feeds" on the horse, the virus is injected into its blood system. In the bloodstream, the virus multiplies and may cause illness.

What are the signs of WNV in horses?

Not all horses become clinically ill. In those that do, following transmission by an infected mosquito, the virus multiplies in the horse's blood system, crosses the blood/brain barrier, and infects the brain. The virus interferes with normal central nervous system functioning and causes inflammation of the brain. Clinical signs include loss of appetite and depression, fever, weakness or paralysis of hind limbs, muscle fasiculations or muzzle twitching, impaired vision, lack of coordination (ataxia), head pressing, convulsions, difficulty in swallowing, circling, hyperexcitability, or coma.

Do these symptoms always indicate WNV?

No. Some other mosquito-borne viral encephalitic diseases of horses caused by Eastern, Western, and Venezuelan encephalitis viruses can cause a horse to demonstrate signs similar to WNV. Additionally, diseases such as rabies, botulism, and equine protozoal myeloencephalitis (EPM) also have signs similar to WNV. If you think your horse is exhibiting signs of encephalitis, contact your veterinarian. Only laboratory tests can confirm a diagnosis of West Nile encephalitis.

Can an infected horse transmit WNV to horses in neighboring stalls?

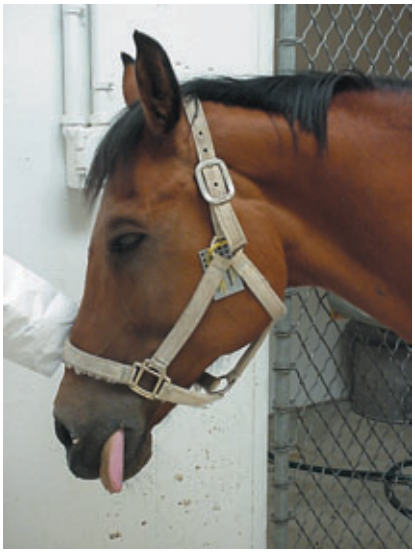
No. There is no documented evidence that WNV is transmitted from horse-to-horse. However, precautions should be taken by removing the horse from further potential mosquito-borne infection and testing for the virus.

What is the treatment for an infected horse?

There is no specific treatment for West Nile virus in horses. Most horses recover from the infection. Treatment would be supportive and consistent with standard veterinary practices for animals infected with a viral agent. Caregivers should prevent the animal from injuring itself.

Is there an equine vaccine protecting against WNV?

Yes. A WNV vaccine for horses has been conditionally approved and is available through veterinarians. The vaccine consists of two intramuscular doses administered three to four weeks apart, followed by an annual booster. Vaccination against Eastern equine encephalitis, Western equine encephalitis, and Venezuelan equine encephalitis will not protect against WNV. ■



A horse with clinical WNV (depressed, paralyzed tongue).

West Nile Virus Research on the Increase at Colorado State

Dr. Dick Bowen is very sympathetic to the panicked biologists working in whooping crane and California condor recovery. Both species, pulled back from the brink of extinction with aggressive breeding, habitat protection, and re-introduction programs, now face a new threat – the West Nile virus.

In 1987, the last wild California condor was taken into captivity. Hunting, poisoning, accidents with power poles, and habitat destruction were leading the birds down the path of extinction. With only 21 of these magnificent birds left on the planet, an unprecedented recovery program was put in place to save the species. By 1998, the population had grown to 150 birds, with 35 of those released to the wild.

In the 1940s, there were between 14 and 16 whooping cranes left in the world. Habitat destruction was the main culprit, with the marshy wetlands needed for whooping crane breeding grounds being drained and turned into farmland. Laws were enacted to protect breeding grounds, and in 1967 a recovery program began to revitalize the species. By 2001, there were 320 whooping cranes and the birds seemed to be thriving.

But the West Nile virus threatens to take these successes away. To date, neither species has tested positive to exposure to the West Nile virus, but scientists aren't sure what to expect if they do. In some species of birds, such as the American crow, raven, and magpie, infection is always fatal. In other species, such as chickens (often used as West Nile "sentinels") and starlings, exposure causes no illness. Researchers are not sure how the virus will affect whooping cranes and California condors, or how populations of exotic and rare birds in national zoos and sanctuaries will fare. So the push is on to find an avian vaccine.

"There are two focuses to our work here," said Dr. Bowen, who is a Professor in the College's Department of Biomedical Sciences. "First, we are evaluating the pathogenesis of West Nile virus in animals including horses, cats, dogs, and pigs as well as birds. We are trying to understand why some animals get sick and others don't and why the virus is able to replicate to such high levels in hosts like the American crow, but not in other species of birds. For example, in crows, viral infection rates are at one billion infectious doses per milliliter of blood, while in horses that number is only 1,000. We aren't sure why that is, but it is definitely why the crow is what's called an amplified host. Mosquitoes can become infected and spread the disease after feeding on an infected crow, but because of the lower numbers of infectious doses in a horse, spread of infection after feeding on an infected horse is unlikely."

"We are trying to understand why some animals get sick and others don't and why the virus is able to replicate to such high levels in hosts like the American crow, but not in other species of birds."

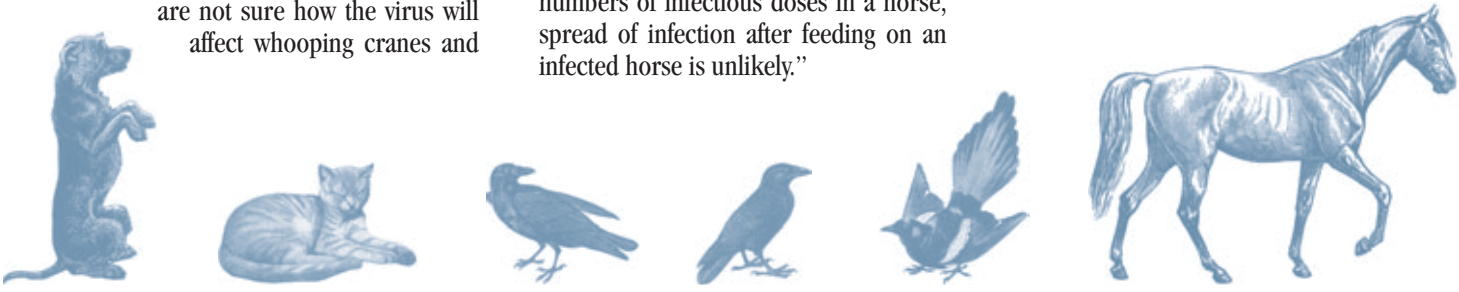
Dr. Bowen said that in addition to studying the pathogenesis of West Nile virus, his laboratory is evaluating vaccines. The researchers are looking at vaccines for horses, cats, and crows, though the avian vaccine is proving to be tough.

"We work closely with the Center for Disease Control in this work," said Dr. Bowen. "Shortly after West Nile virus was first reported in 1999, the CDC went to work on a vaccine for horses and continues to develop others. We help determine if the vaccine is reasonable, then the rights to that vaccine typically are sold to a private company that in turn works with us to conduct further evaluations of the vaccine."

Although a vaccine for horses already is available, additional studies are being conducted on new equine vaccines. Also important, said Dr. Bowen, is the fact that information gleaned from studies on animal WNV vaccines is applicable to human medicine and one day may help with the development of a vaccine for people against WNV.

"Although people are at a very low risk for contracting West Nile encephalitis, now that the virus is here to stay we want to be working proactively to protect not only animals at risk, but people, too," said Dr. Bowen. "What we learn here should provide some insights into the pathogenesis of West Nile virus, as well as effective vaccination routes."

Funding for the research work underway in Dr. Bowen's laboratory is provided by the CDC, the Office of the Dean, the horse industry, and private biotechnology companies. ■



Equine Researcher Ramps Up Colorado Studies on West Nile Virus

It was the year 2000 when Dr. Josie Traub-Dargatz had the opportunity to work with a group of researchers at the Centers for Epidemiology and Animal Health on a virus that was relatively new to the United States – the West Nile virus (WNV). Dr. Traub-Dargatz, a Professor in the Department of Clinical Sciences, had a feeling that this new threat to horse health was here to stay, and she wanted to be involved with the research this exotic infectious disease would require.

The result of that early work was a case-control study that examined environmental and management factors associated with equine exposure to West Nile virus. The study, published in 2001, was a sign of things to come. In 2002, WNV made its way to Colorado, and Dr. Traub-Dargatz and her research associates now had the virus on their doorstep.

One of the first things undertaken by the Department of Clinical Sciences to combat WNV was horse-owner education and a vaccination clinic to help protect horses. The clinic was organized by the James L. Voss Veterinary Teaching Hospital ambulatory faculty, including Drs. Racquel Rodeheaver and Joe Stricklin, students, and support staff, with the cooperation of many equine veterinarians in Larimer County. New research projects also were kicked off to help veterinarians and scientists develop a better understanding of the virus, risk factors for exposure, remediation of risk factors, and the development of a database to track the virus in individuals and populations.

"West Nile is so new to our state that we are still in the process of developing research ideas," said Dr. Traub-Dargatz. "But one thing we already are working on and have approval for is blood testing. We are hoping to collect blood samples from up to 300 horses to determine the number that have been exposed to West Nile virus, determine the percent that go on to develop the disease, and determine the antibody response in horses that receive the WNV vaccine and in those that have recovered from the disease. We are starting out with the very basic ideas regarding what we want to study. We have a lot of work ahead of us. The Animal Population Health Institute here at Colorado State is providing financial support to assist us in this preliminary work with WNV."

One of the first things undertaken by the Department of Clinical Sciences to combat WNV was horse-owner education and a vaccination clinic to help protect horses.

Dr. Dewell and Dr. Davidson doing sampling at vaccination clinic.

Research conducted so far, as reported in the August 2001 *West Nile Virus in Equids in the Northeastern United States in 2000*, does provide some answers to the many questions surrounding WNV. An important discovery was that WNV appears to be geographically clustered around areas with large mosquito and communal bird populations. The study also recommended ecological assessment of areas where WNV is found to determine species of mosquitoes and infection status of free-ranging birds.

While studies are getting underway, Dr. Traub-Dargatz recommends that owners not wait but go ahead and get their horses vaccinated.

"If a horse gets two vaccinations this year and one early next year, they more likely will be protected than if owners wait until next spring to start the vaccination series," Dr. Traub-Dargatz said. "I am advising owners to go ahead and protect their horses. The vaccine was approved because of evidence it creates an immune response to WNV, and it is one of several ways owners can protect their horses against an infection that will kill 20 to 30 percent of horses that develop clinical signs of disease."

One study that Dr. Traub-Dargatz is proposing is follow-up tests of serum to determine the antibody response in vaccinated horses, as well as following up with horse owners who had animals that became ill from WNV.

"Right now, we hope to learn from this follow-up to see what has happened to the horses that develop disease from WNV infection," said Dr. Traub-Dargatz. "We want to get a better idea of what is happening in the horse population when it is challenged with WNV. This not only will help us in planning future studies, but also will help us plan for next spring when WNV is back." ■

A complete copy of *West Nile Virus in Equids in the Northeastern United States in 2000* is available at www.nahms.aphis.usda.gov.

Dedications Set for New Hospital Facilities

After years of fundraising, planning, preparing, and building, the time has finally come to dedicate two new facilities that will greatly enhance research, education, and outreach programs at the College of Veterinary Medicine and Biomedical Sciences.

On November 1, the Gail Holmes Equine Orthopaedic Research Center will celebrate its grand opening with a dedication ceremony at 2 p.m., followed by an open house until 4 p.m. Gail Holmes will be a guest speaker at the ceremony.

On November 6, the new wing of the James L. Voss Veterinary Teaching Hospital will be dedicated with an open house tour of the Animal Cancer Center, Argus Institute, and new exam rooms from 1-3 p.m. and ceremony at 3:30 p.m. General Norman Schwarzkopf will be a special guest at the dedication of the new wing. Friends, supporters, faculty, staff, students, and clients are invited to attend the festivities.

"We want to use the dedications not only as an opportunity to celebrate the completion of these fine facilities, but also to thank the many people who made them possible," said Dr. Lance Perryman, Dean of the College. "Without the support of our friends and donors, faculty, staff, and students, none of this would have been possible. But people had a commitment to our vision of excellence and helped to make that vision a reality."

James L. Voss Veterinary Teaching Hospital Addition

For the past three years, the College of Veterinary Medicine and Biomedical Sciences has been engaged in a private and public campaign to raise $11 million for the much-needed addition to the Veterinary Teaching Hospital. The campaign enlisted the efforts of well-known personalities such as General Schwarzkopf, Hollywood's Bart the Bear, Governor Bill Owens, and New York artist William Wegman, all of whom volunteered their time or talents for public service ads. The addition is now a reality.

The new 35,000-square-foot, two-story addition is the showplace for the Robert H. and Mary G. Flint Animal Cancer Center, the Argus Institute for Families and Veterinary Medicine, and the Shipley Natural Healing Center. The new addition contains examination rooms, state-of-the-art research laboratories, a special multipurpose training and lecture room, tumor tissue processing and archiving, and magnetic resonance imaging and nuclear medicine capabilities. The second floor houses office and administrative space. The Veterinary Teaching Hospital also received a face lift with a new exterior front façade of brick and stucco, a remodeled entrance, and an expanded, remodeled client waiting room.

Within its new facilities, the Animal Cancer Center will continue to conduct innovative cancer research and provide state-of-the-art treatment for companion animals. The Shipley Natural Healing Center will focus on the scientific evaluation of a broad range of natural medicines and therapies. Support of the human-animal bond in teaching, client services, and outreach is the role of the Argus Institute for Families and Veterinary Medicine. The new facilities will enable the Argus Institute to expand its services including veterinary education, client support, continuing education, and a new program in animal behavior.

Some key facts about the new wing:

- 34,700 square feet on two floors
- 12 new, fully equipped exam rooms
- Observation rooms for training and teaching.

A front and side view of the new wing of the James L. Voss Veterinary Teaching Hospital during construction.

- New office and administrative space on the second floor
- 10 new laboratories for cancer research including tissue archiving laboratory, bone research laboratory, and bioengineering laboratory
- Nuclear medicine suite
- Magnetic resonance imaging suite
- Millennium VG coincidence imaging gamma camera room
- Special multipurpose classroom and training room equipped with video presentation capabilities and moveable walls to tailor space for each event
- Darkroom for image analysis
- Separate entrances for the Argus Institute and the Animal Cancer Center
- Special pet tribute garden: landscaped garden area with a brick walkway located in the front of the new wing

A front and back view of the completed Gail Holmes Equine Orthopaedic Research Center located behind the James L. Voss Veterinary Teaching Hospital.

Gail Holmes Equine Orthopaedic Research Center

Funding for the new Equine Orthopaedic Research Center and remodeling of the existing Orthopaedic Research Laboratory was secured through private donations. A generous gift of $600,000 from Herbert Allen and Gail Holmes brought total donations to the $1.1 million necessary to build the new surgical and animal care facility, located north of the Veterinary Teaching Hospital. Other major donors included Coolmore Stud, the Thoroughbred Corporation, and Mark Dedomenico, who also is co-chair of the Orthopaedic Research Advisory Board. A gift of $250,000 from Barbara Cox Anthony allowed for the continuation of renovations on the space allocated to orthopaedic research in the Dairy Science building, also north of the Veterinary Teaching Hospital.

The new facility features surgical suites, a visitor's center, office space, and two wings of deluxe stalls for up to 32 resident horses, along with an outdoor run and a separate commons paddock for exercise space. The new space enables team members to regularly schedule surgical procedures rather than sharing surgery space with the Veterinary Teaching Hospital, where surgical room time is at a premium.

Major areas of research in the Equine Orthopaedic Research Program are articular cartilage healing, role of microdamage to the subchondral bone in traumatic joint disease, development of synovial fluid and serum markers to detect early damage to articular cartilage and subchondral bone in joint disease, intravenous hyaluronic acid and its mechanism of action, gene therapy, and studies on the effect of conformation and racetrack surface.

"The completion of these two facilities moves us to a different plane of research," said Dr. David Frisbie, Assistant Professor with the Department of Clinical Sciences and Manager of the Equine Orthopaedic Research Laboratory. "We will be able to get larger corporate accounts and be competitive for larger grants in arthritis research. We'll also be able to consolidate and modernize our research facilities, enabling us to work more efficiently and with greater quality."

The remodeled laboratory includes space for the large Materials Testing Machine, currently underused because of space limitations, and the Biomedical Engineering Program; hard tissue histology and molecular biology laboratories; graduate student office space and commons room; and a darkroom, freezer, and walk-in cooler, all essential to the program's operations. ■

For additional information about the dedication ceremonies for the new wing of the hospital or the Gail Holmes Equine Orthopaedic Research Center, contact the College's Office of Development at (970) 491-0663.

Genomics, Proteomics, Transgenics: The New Worlds of Science

It was in the mid-1800s when Gregor Mendel, an Austrian monk, first performed comprehensive and systematic genetic experiments in a secluded garden where he cultivated peas. He spent years meticulously crossbreeding tall and short plants and plotting traits passed on from the parent plants to the offspring. Mendel developed numerous theories and introduced something he called the "gene," which he defined as the basic unit of heredity. Mendel could not have imagined the complexity of the system he had only just begun to discover.

Fast-forward 150 years, and we have moved from the simple pea plant to the human genome project – a decade-long undertaking to map and sequence the 40,000 genes of the human genetic code (although this number still is controversial). Scientists around the world now are studying the nature of life in more highly defined ways. At Colorado State University, joint research efforts between the College of Veterinary Medicine and Biomedical Sciences, the College of Agriculture, and the College of Natural Sciences are incorporating genomics, proteomics, and transgenics as scientific tools to advance cutting-edge research into everything from basic cell function to the workings of infectious diseases.

"To resolve a complex disease problem, we have to define the disease problem and then find a solution," said Dr. Lance Perryman, Dean of the College of Veterinary Medicine and Biomedical Sciences. "We have to discover the basis of disease at the molecular level, then resolve it by applying what we learn to medical practices in the hospital, clinic, and field. For the last 10 years, we have focused on the genetic level using genomics and transgenics, both still powerful tools. But we now are expanding to look at proteomics – the proteins encoded by genes – and how changes in levels of proteins or changes in the proteins themselves influence animal health and disease."

Genomics

Genomics is an approach that allows researchers to examine changes in the expression of the entire genome of an organism in response to a specific stimulus, mutation, or disease process. This analysis generally is based upon gene chip assays. The entire genome of most organisms can be analyzed using only a few chips. Dr. Laurie Stargell, an Associate Professor in the Department of Biochemistry and Molecular Biology, is one researcher who uses genomics and gene chip assays heavily in her research work in yeast.

Gregor Mendel, the "Father of Genetics."

"The basic principles of gene expression are conserved as we move from yeast to humans," said Dr. Stargell. "So we can learn a lot about genes by working with a simple model like yeast. In addition, the technology and techniques we develop working with a simpler system will apply to humans, though on a huge scale."

In her laboratory, Dr. Stargell is working to understand transcriptional regulation of gene expression in yeast, which have only 6,500 genes compared to the 40,000 in humans. Her research team can make mutations and look at the effect of those mutations on gene expression profiles. They can change or delete genes and use the gene chip assays to see how gene expression has been changed. Her work is in collaboration with Pharmacia and Upjohn for its anti-fungal potential and is funded by the

Dr. Laurie Stargell

National Institutes of Health and by the March of Dimes for its application to the prevention of birth defects.

"Genomics is such a powerful tool that it has a wide band of influence across academia, industry, medicine, and basic science," Dr. Stargell said. "Working with yeast, we are looking at how genes are regulated, what are the underlying concepts, the proteins synthesized, signaling, and more."

Genomics, which is the analysis of DNA and RNA, has been used as a research tool at Colorado State for a number of years. In 1990, Macromolecular Resources was developed as a core facility at the University to provide DNA sequencing, synthesis of oligonucleotides and peptides, mass spectroscopy analysis, and other services. Gene chip assays are a newer tool used in a number of laboratories, including Dr. Stargell's. Dr. Dennis Knudson of the Agricultural Genomics of Pathogens, Pests and Plants program is collaborating with Drs. John Belisle and Richard Slayden of the Department of Microbiology, Immunology, and Pathology to print *Mycobacterium tuberculosis* microarray slides on campus.

Proteomics

Decoding the human genome has led to the next big step in science: developing an understanding of the proteome – the proteins that genes help make. Though proteomics has been around for quite some time, it is only recently with the completion of several genome mapping projects – including the mouse genome, human genome, and, earlier, the yeast genome – that proteomics is ready to come to the forefront.

"We are just beginning to look at proteins on a proteomic scale in our laboratory," said Dr. Stargell. "But proteins are the real players. The genes determine what proteins are made, but it is the proteins that do the actual work in the cell."

Researchers in the Mycobacteria Research Laboratories are using proteomics tools to compare the proteins of *M. tuberculosis* cells to identify factors that lead to virulence and to target antigens. In the Department of Chemical and Bioresource Engineering and the Center for Environmental Toxicology and Technology, proteomics is being used to better understand the breakdown of hazardous waste and how toxins affect cellular processes.

"Many people grasp gene structure, but fewer appreciate the role protein expression plays in disease and health," said Dr. Perryman. "We think that proteomics, where we study the structure and function of proteins, is the next frontier of scientific discovery."

Proteomics does have much promise, not only as a research tool, but also as a possible source of treatment breakthroughs for many different diseases, including cystic fibrosis. In the human lung, one protein's function is to move salt in and out of the lung cells. Working with other proteins, it regulates salt levels. In cystic fibrosis, this same protein is incorrectly folded. Because it has the wrong shape, it is either ignored or destroyed by other proteins so it can't do its job. Salt builds up in the lung cells, producing a thick mucus than can become infected and eventually kill the patient. Researchers one day may be able to create proteins to fix the incorrectly folded protein, using proteomics to define form and understand function.

Transgenics

The Transgenic Core Center at Colorado State University has been involved with the development of transgenic animals for the last five years. The Center, located in the College's Animal Reproduction and Biotechnology Laboratory on the Foothills Research Campus, provides an important service that has become an indispensable part of modern biological research.

The idea behind transgenic animals is simple, though the techniques are difficult. A researcher provides clones of the gene he or she is interested in, then the Center staff puts the gene in the appropriate vector and incorporates it into a mouse genome. Once the gene is established, a portion of the offspring of the genetically engineered mouse population will express that gene. Researchers can then study and better understand the effects of specific genes. In addition to gene introduction, normal genes can be removed (a knock-out), and then the animal is evaluated for functions associated with the knock-out gene.

One dramatic example of research being done with transgenic mice is a study of the role of leptin in the body. Leptin is a hormone produced by fat cells. It is essential to the healthy func-

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At Colorado State University, joint research efforts between the Colleges of Veterinary Medicine and Biomedical Sciences, Agriculture, and Natural Sciences are incorporating genomics, proteomics, and transgenics as scientific tools to advance cutting-edge research into everything from basic cell function to the workings of infectious diseases.

Genomics, Proteomics, Transgenics: The New Worlds of Science

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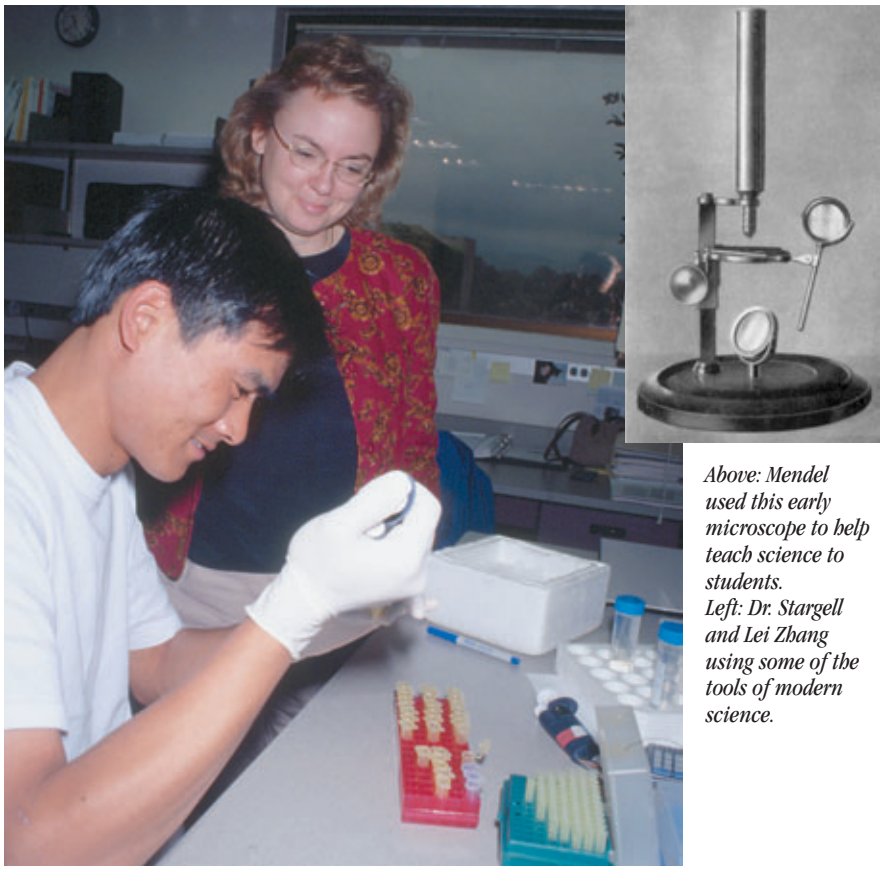


Above: Mendel used this early microscope to help teach science to students. Left: Dr. Stargell and Lei Zhang using some of the tools of modern science.

tioning of the reproductive system and to maintaining proper body fat levels. Researchers have shown that mice with insufficient leptin levels become very large. Leptin's normal function in the human body is being looked at as one reason for weight gain in late middle-age as people become resistant to the effects of leptin, similar to diabetics becoming resistant to the effects of insulin.

"By using mice as models for humans, we have a better understanding of disease and how genetics can affect health," said Dr. Terry Nett, Associate Dean for Research at CVMBS and a Professor in the Department of Biomedical Sciences. "Transgenic mice provide an excellent tool for studying specific genes, helping researchers to clarify the role of those genes and the part they play in health and disease."

Transgenics has applications in many other areas of disease research, including that of Alzheimer's disease.

"Transgenic mice have been created with genetic alterations in specific proteins that result in the formation of amyloid plaques," said Dr. Nett. "These substances are thought to cause progressive loss of abstract thinking and memory in Alzheimer's patients. These mice are proving to be invaluable for answering critical questions about the molecular basis of a disorder that affects about 4 million people in the United States alone."

A University Center for Genomics, Proteomics, and Transgenics

A recent grant from the University's Office of the Vice President for Research provided a major boost to efforts already underway at the College to enhance its programs in genomics, proteomics, and transgenics. The joint proposal, developed by Dr. Nett and Dr. Norm Curthoys, a Professor in, and Chair of, the Department of Biochemistry and Molecular Biology, addresses the need to invest in state-of-the-art equipment, enhance graduate and undergraduate education and research opportunities in these fields, increase faculty and technical staff with expertise in this area, and position the University as a leader in these advanced sciences.

The Colleges of Veterinary Medicine and Biomedical Sciences, Natural Sciences, and Agriculture committed their own resources – dollars and people – to this project, while the University provided a $1.3 million grant.

"During the last 10 years, faculty have been purchasing equipment, getting funding for proposals, and building these programs at the individual level," said Dr. Perryman. "With the money from the University's Academic Enrichment Program, we now have a substantial investment to bring us to the next level."

Dr. Perryman said the majority of the funding would go to purchase the new instrumentation needed for advanced studies in genomics, proteomics, and transgenics, including high through-put DNA sequencing, low-scale oligonucleotide synthesis, gene chip analysis, 2-D Gel System, systems for data analysis, additional equipment for microinjection of DNA, and more. Investment also will be made in bringing on board new faculty and staff, training, and facility expansion.

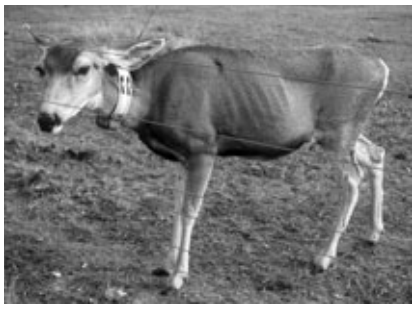
The tools, the technology, and the people involved in the studies of genomics, proteomics, and transgenics have come a long way since Gregor Mendel and his simple pea plants, but the concepts are the same – to discover new knowledge, to shape that knowledge into application, and improve the lot of humankind by putting that application into action. ■

Rapid Test Enhances Monitoring Efforts of Chronic Wasting Disease

A rapid test initially used to screen cattle in Europe for bovine spongiform encephalopathy (BSE) is now in use to screen deer and elk in Colorado for chronic wasting disease (CWD). The test, released for limited use during the deer hunting season, is part of a pilot surveillance system of CWD in Colorado being implemented through a cooperative program of the Colorado Division of Wildlife (CDOW), the USDA's Animal and Plant Health Inspection Service, Colorado State University and its Veterinary Diagnostic Laboratories, the Colorado Department of Agriculture, and the Colorado Veterinary Medical Association (CVMA).

Chronic wasting disease, first described as a wasting syndrome in Colorado in 1967, is a transmissible spongiform encephalopathy (TSE) of deer and elk. CWD is believed to be caused by prions – abnormal forms of a normal protein – that infect the host animal by converting normal proteins to the abnormal form. The prions, most frequently found in the central nervous system, cause damage to brain tissue resulting in a spongelike appearance. Most cases of CWD occur in adult animals. Transmission pathways for this progressive and fatal disease are unknown.

"A definitive diagnosis of CWD requires laboratory testing of tissue," said Dr. Mo Salman, Director of the Animal Population Health Institute at Colorado State and a Professor in the Departments of Clinical Sciences, and Environmental and Radiological Health Sciences. "Diagnostic laboratories have been using a technique called immunohistochemistry (IHC) to test brain tissue for the presence of prions to diagnose CWD. This type of testing, while the gold standard, requires specially equipped laboratories and highly skilled pathologists. The rapid test gives results more quickly, can be done by trained technicians, and offers benefits that will allow for wider screening with positives being followed up with the immunohistochemistry testing."



A mule deer showing symptoms of chronic wasting disease. (Photo courtesy of Dr. Christina Sigurdson, Assistant Professor in the Department of Microbiology, Immunology, and Pathology.)

Dr. Salman said that what researchers have done is borrow the existing screening test used for BSE in Europe. Using a technique known as ELISA, the test looks for the abnormal proteins by using a specific reaction that identifies tissues with prions. The test can be run in four to five hours, as compared to four days for the IHC. During hunting season, the test is voluntary except in certain areas where the disease is endemic and participation in the screening test is required. A detailed listing of these areas is available at the CDOW's Web site at www.wildlife.state.co.us.

For this hunting season, the first approximately 5,000 samples will be tested by both the rapid test and IHC as part of field validation. To date, more than 700 samples have been tested with 100 percent agreement between the rapid test and IHC. A crucial and labor intensive part of this testing process is collecting brain and lymph node samples from hunter-harvested deer and elk. This procedure is performed by the CDOW at collection sites across the state with assistance from 23 veterinarians of the CVMA through its Hunter Assistance Program. The rapid test and the IHC then are performed by Colorado State veterinary diagnostic laboratories in Fort Collins, Grand Junction, and Rocky Ford. Results are reported to the CDOW through their team of data managers.

The surveillance system will run through February 2003. After that, Dr. Salman said the research group will provide a report to the USDA with recommendations on what system will work best for monitoring CWD.

Monitoring CWD is only part of the equation, however. Research work continues on CWD to determine the ecology and pathogenesis of the disease. Work in Dr. Ed Hoover's laboratory also is looking at developing a live test for the disease as well as a vaccine.

"We currently are working to determine if the CWD agent is carried in deer saliva or urine, as well as working on a rapid screen test that will test specifically for CWD," said Dr. Hoover, a Professor in the Department of Microbiology, Immunology, and Pathology. "At the same time, we are working on a vaccine approach as well. We have had success in developing other vaccines, including a vaccine for feline leukemia virus, and want to put that expertise to work on CWD."

State and federal interest in CWD is increasing not only because it occurs in elk and deer and appears to be spreading geographically, but also because it is a good model for research into TSEs that occur in humans. This includes Creutzfeldt-Jakob disease and *variant* Creutzfeldt-Jakob disease, which was linked to a BSE outbreak of cattle herds in Great Britain.

"Right now, there are still so many questions about TSEs that we just are beginning to scratch the surface," said Dr. Hoover. "Improved screening and testing, and a greater understanding of the disease's basic pathology, should help to advance our efforts toward a reliable test and an effective vaccine. We hope that with what we learn, we also can help along the science for other TSEs, including those that afflict humans." ■

Researchers Produce First Foal from Oocytes Shipped Across Country

Thanks to Colorado State University researchers, Heaven Only Knows is the first foal born from oocytes harvested from the ovaries of a deceased mare and shipped across the country from Virginia to Colorado for transfer into a surrogate.

"The ability to successfully obtain viable oocytes from transported ovaries means we can offer breeders a lot more options when dealing with the death of a valuable mare," said Dr. Ed Squires, a Professor in the Department of Biomedical Sciences and faculty member with the Animal Reproduction and Biotechnology Laboratory (ARBL) at Colorado State. "We've been able to make amazing strides in reproductive science over the past decade, and this is just one of our successes."

The process of obtaining and transferring oocytes, which consist of a single cell, from one mare's ovaries to another is a delicate operation in and of itself, without even factoring in the hazards of shipping from Virginia to Colorado.

At the time the ovaries were harvested, the mare, Jaguars Bar Bee Doll, had been dead for several hours. However, the veterinarian, Dr. Vito Del Vento, a Colorado State graduate, recalled that ARBL had been doing extensive research into oocyte transfer, and he made a call.

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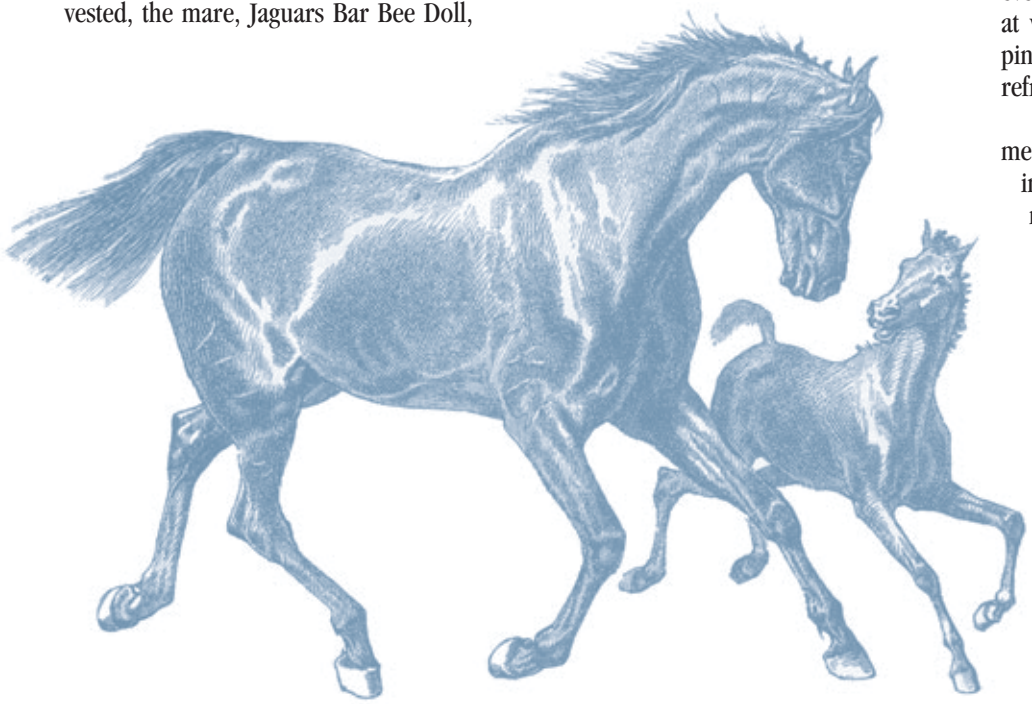
The ovaries were shipped the same day and were delivered to Drs. Lisa MacLellan and Marco Coutinho da Silva at ARBL. Oocyte recovery began immediately by carefully scraping the ovaries, then culturing the six oocytes they were able to retrieve and allowing them to mature overnight in an incubator. The next day, five of the six were transferred into a recipient mare from the ARBL herd.

Although the conception rate for immature oocytes is only 10 percent to 20 percent, 11 months later Heaven Only Knows was successfully delivered on the Hylton Farm in northern Virginia.

Shipping ovaries is not like shipping semen, which is a procedure pioneered at ARBL. As Dr. Squires points out, there are a thousand sperm in a shipment of semen, but there are a limited number of oocytes in a mare's ovaries, and they are much more fragile. Researchers are not even certain of the optimum temperature at which to store the ovaries for shipping. In this case, the ovaries were not refrigerated or cryogenically preserved.

"We are still working out the best method for shipping the ovaries, including developing appropriate containers, method of transportation, and more," said Dr. Elaine Carnevale, a lead researcher with ARBL. "One day, we hope to be able to offer breeders the option of shipping ovaries to us for egg recovery and we hope to be able to mature them and transfer them immediately or freeze them for transfer at a later date."

Last year, the ARBL team made an important breakthrough when they successfully delivered twin foals, Vitreous and Ethyl, from oocytes frozen, thawed, and transferred to two different recipient mares. ■



New Barn Offers Ample Room for Visiting Stallions

A new barn located on Colorado State University's Foothills Campus is giving visiting stallions something to kick up their heels about – big stalls, spacious turnouts, and a view of the foothills. The new stallion barn, adjacent to the Equine Reproduction Laboratory, opened in late summer and already is bustling with activity.

The new facility is comprised of 1,200 square feet for semen collection, a barn to house 10 stallions for the breeding season, and expanded laboratory space for the freezing, storage, and export of semen. Construction costs were more than $300,000. Generous gifts from Gail Holmes and Herbert Allen of Double Dove Ranch and Shirley Hoffman of Hi View Acres, both of Longmont, Colorado, made the building possible. A copper roof, decorative cupolas, and a main corridor lined with rubber pavers are features of the new building, which is specially designed to withstand the added stress that stallions can put on facilities.

"In order to meet USDA and EU requirements, the facility must have appropriate laboratory space and equipment, an area for the safe collection of semen, and appropriate facilities for housing stallions," said Dr. Ed Squires, a Professor in the Department of Biomedical Sciences and faculty member with the Animal Reproduction and Biotechnology Laboratory (ARBL) at Colorado State. "We are dedicated to offering our clients the best possible services. In order to do that, it meant expanding our facilities to meet all their needs. We feel we now can offer the best reproductive services available since, with the new approval rating, we also can export semen anywhere in the world."

From January to July, the Equine Reproduction Laboratory, part of the Animal Reproduction and Biotechnology Laboratory, handles nearly a hundred stallion clients from around the United States. The new facility will allow the staff to increase and extend research that is vitally important to the equine industry.

Three views of the new stallion barn at the Foothills Campus.

Dr. Pat McCue, an Associate Professor with ARBL, said stallions need more room than mares, so the barn had to be designed with stalls that were big enough and with walls and doors strong enough in which to keep a stallion. The barn was needed because the demand for space had simply outgrown supply.

Client horses in the new barn typically are brought to Colorado State for reproduction evaluations, or to stand at stud during breeding season. Currently, the ERL offers client services that include the collection and freezing of semen for international export, semen storage, fertility evaluations, and the breeding of mares using either fresh semen, cooled shipped semen, or frozen semen.

As a global business, equine reproduction typically was an expensive, arduous, and often dangerous enterprise that frequently required live animals to be shipped across the country or across oceans and continents to mate the right bloodlines. Today, thanks to modern science and technology, the process has become safer and easier for owners and participants.

Since 1967, researchers at the Animal Reproduction and Biotechnology Laboratory have made many breakthroughs in the field of equine reproduction including:

- First foal born from oocytes harvested from a deceased mare and shipped across country
- Procedures for cooling and shipping embryos
- Procedures for freezing embryos
- First foal from sperm injections
- First foal from oocyte transfer
- First foal from frozen/thawed oocyte
- Identical twins from split embryos ■

Tribute Garden a Place of Serenity, Remembrance

People working at veterinary teaching hospitals and clinics are used to the sights, smells, and sounds that surround them every day. They probably even find that this environment is comforting because it is part of their routine. For clients and patients, though, a trip to the hospital is anything but routine. The slippery linoleum, cold steel accoutrements, animal noises, ringing phones, pagers, and other assaults on the senses often leave visitors stressed.

The James L. Voss Veterinary Teaching Hospital has had a grassy area with trees and a few benches to provide a welcome reprieve from the hustle and bustle of the hospital for patients, clients, faculty, staff, and students. Over the years, several memorials had been placed in this area to honor pets and people.

With the expansion of the hospital, this area was uprooted. Memorial benches were put in storage and shrubs and plants moved, but most of the old trees remained. When the new wing of the hospital opens this fall, it will feature a new garden – the Tribute Garden. This garden will incorporate the old feelings of comfort and security and feature a Path of Honor that will wind through the garden. This path is the tribute part of the garden. More than 1,300 bricks will display messages of tribute. These message bricks, many already waiting to be placed, come from a wide variety of donors. There are many people memorializing their pets, but there also are veterinary medical students honoring their parents or a special professor, tributes to doctors who helped save a beloved pet, words of wisdom from famous philosophers, and much more.

Four-year-old Ethan Linderer wants to be sure everyone will always know that he and his dog Jasmine are "Best Pals." Emily Asay expresses thanks to mom and dad for helping her through veterinary school. Mitzi Sue is honored as a "gentle helper" for her years of work as a therapy dog that brought smiles and laughter to patients at the Lutheran Medical Center and the local nursing home. These words of tribute by family, friends, colleagues, and grateful clients are among the hundreds being inscribed on bricks that will become the Path of Honor.

The garden also will be home to the fountain and memorial benches from the old garden; special quiet places; a variety of plants, shrubs, and trees; and, in the future, other tributes reflecting the strength and beauty of the human-animal bond.

"For years, the grounds to the southwest of the hospital have offered a convenient outdoor locale for clients and visitors to spend time with hospital patients or to enjoy a quiet conversation. Over time, it has taken on special meaning to the veterinary students, clients, and staff," said Dr. Wendell Nelson, Director of the VTH. "Building the new wing gave us the chance to recreate this unique garden among newly landscaped grass, trees, and foliage."

Dr. Lance E. Perryman, Dean of the College, said the Tribute Garden and Path of Honor will be dedicated to the alumni, students, clients, patients, and staff who together have created a legacy that honors the spirit and tradition of client and patient care at the James L. Voss Veterinary Teaching Hospital.

"What better way to capture the essence of the work being done at the hospital than this special walkway with messages of love, respect, and endearment to be shared with the thousands of people who come to the hospital each year," said Dr. Perryman.

A gift of $100 provides a 4" x 4" brick inscribed with up to three lines of copy, and a gift of $250 provides for an 8" x 8" brick with up to seven lines of copy. All gifts to the Path of Honor beyond the general construction costs will be used to maintain the garden, create client comfort rooms within the new wing, and enhance services provided by the hospital.

For more information, contact Debby Morehead, Associate Director of Development at the College, at (970) 491-3251 or, visit the Web site at www.cvmbs.colostate.edu/cvmbs/devel.html. ■

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"What better way to capture the essence of the work being done at the hospital than this special walkway with messages of love, respect, and endearment to be shared with the thousands of people who come to the hospital each year."

Colorado State University invites you to pay tribute to a special pet or person with an inscribed brick in the Path of Honor at the James L. Voss Veterinary Teaching Hospital. Your personal words of tribute will create a permanent legacy that honors the special relationships people share with their pets.

Especially designed for pet owners and pets, the Path of Honor provides a peaceful walkway of reflection surrounded by the flower gardens, grassy areas, and secluded alcoves of the Tribute Garden on the grounds of the Hospital.

Engraved bricks within the Path of Honor will be read by thousands of people who visit the hospital each year. Your words will forever be a part of the healing atmosphere that celebrates the human-animal bond.

Dogs, cats, horses, ferrets, birds, exotics – any and all species may be honored. Many donors inscribe their bricks as memorials to beloved pets. Some make dedications to family members, friends who deeply love animals, or veterinarians who share a special bond with their pet, while others simply inscribe their own name as a declaration of their tribute to the human-animal bond.

Throughout the Tribute Garden, there will be a limited number of benches designated to honor a special pet or person. Each bench includes a bronze plaque inscribed with your special message. Bench availability will be on a first-come, first-served basis.

"The Path of Honor is a great way to honor my veterinarian for his extraordinary care of my beloved dog Hershey."
Mark Reynolds, Windsor, Colorado

"What a perfect setting for our family to honor our loyal companion, Tessa, for her friendship and unconditional love."
The King Family, Prescott, Arizona

"We're so glad we have the opportunity to honor our pets in this meaningful way. They were the best of friends, and now their memories can live forever."
Joe and Nancy Smith, Fort Lauderdale, Florida

Veterinary Diagnostic Lab Selected as Core Facility for New USDA Program

The United States Department of Agriculture has selected the Veterinary Diagnostic Laboratory at the James L. Voss Veterinary Teaching Hospital as one of five core foreign animal disease surveillance and rapid detection laboratories serving the country.

As a core facility, the Veterinary Diagnostic Laboratory will receive a $2 million grant to purchase new equipment, upgrade existing laboratory work stations, and hire additional personnel. Approximately half of the grant will be used to purchase a modular BL3 (biosecurity level three) laboratory for testing of tissues with potentially infectious agents. The national network of laboratories is designed to share information rapidly and confidentially and use a common computer system for data communication. In addition to monitoring and information sharing, the core laboratories will be validating genomic and proteomic diagnostic tests developed by the USDA.

"The five core laboratories are part of the USDA's efforts to build a diagnostic network across the country that is responsible for the surveillance and detection of foreign animal diseases that might be accidentally or purposely introduced to this country," said Dr. Lance Perryman, Dean of the College. "The USDA selected a number of universities for this program, some to focus on animals and some to focus on plants. We were one of the five labs with an animal focus selected as a core laboratory and, in addition, 12 were selected as satellite laboratories."

Dr. Perryman said the selection of Colorado State's Veterinary Diagnostic Laboratory is a reflection of the superb quality of work at the laboratory, which is under the direction of Dr. Barbara Powers.

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"The Veterinary Diagnostic Laboratory was selected based on several factors including its emphasis on infectious diseases research, geographical location in the country, and the fact that we have a "digester" that will destroy infectious agents," said Dr. Powers, Director of the Laboratory. "We are greatly honored to be selected as a core laboratory and look forward to working closely with the USDA to protect our country's agricultural animal populations from foreign threats."

The WR^2 Digester is a specialized alkali digestion system that disposes of animal carcasses while destroying infectious agents. It is one of the few systems approved to destroy animal carcasses infected with prion-based diseases such as chronic wasting disease in deer and elk and scrapie in sheep. Prions are difficult to destroy, proving impervious to most sterilization techniques such as high heat and antimicrobial agents. Having the digester already on site enabled the Veterinary Diagnostic Laboratory to meet the stringent demands of a USDA core laboratory.

The USDA currently is asking the core and satellite laboratories to monitor seven foreign animal diseases. These include foot-and-mouth disease, rinderpest, lumpy skin disease, and contagious bovine pluropneumonia in cattle; classical swine fever and African swine fever in pigs; and exotic Newcastle disease in poultry. Additional diseases may be added as warranted.

"The threat of foreign animal diseases has been with us for many years, and the concept of a national network of laboratories has been in the works for some time with the American Association of Veterinary Diagnosticians," said Dr. Powers. "But with 9/11, efforts to establish a network took on a new sense of urgency as there became greater concern about biosecurity and the health of our agricultural animal populations. We are very excited to be a part of these efforts." ■

Continuing Education Courses

Equine Reproductive Management and Artificial Insemination
Dates: Oct. 31-Nov 3, 2002; Nov 21-24, 2002; Jan. 3-6, 2003
Fee: $850
Instructors: Drs. J.E. Bruemmer, E.M. Carnevale, P.M. McCue, P.D. Siciliano, E.L. Squires, and graduate students
Contact: www.csuequine.com, equinesc@colostate.edu, 970-491-8509

Techniques for Handling and Utilizing Transported Cooled Equine Spermatozoa
Date: Nov. 4, 2002; Nov. 25, 2002; Jan. 7, 2003
Fee: $350
Instructors: Drs. J.E. Bruemmer, E.M. Carnevale, P.M. McCue, P.D. Siciliano, E.L. Squires, and graduate students
Contact: www.csuequine.com, equinesc@colostate.edu, 970-491-8509

Techniques for Handling Transported Frozen Equine Spermatozoa
Dates: Nov. 5, 2002; Nov. 26, 2002; Jan. 8, 2003
Fee: $500
Instructors: Drs. J.E. Bruemmer, E.M. Carnevale, P.M. McCue, P.D. Siciliano, E.L. Squires, and graduate students
Contact: www.csuequine.com, equinesc@colostate.edu, 970-491-8509

Botanical Medicine: Western Herbs for Large and Small Animals
Date: Nov. 9-19, 2002
Fee: $300
Instructor: Gregory L. Tilford, herbalist
Contact: www.aavma.org, equinesc@colostate.edu, 970-491-8509

Current Topics in Equine Care
Date: Nov. 15-16, 2002
Fee: $100
Instructors: Drs. C.W. McIlwraith, P.D. Siciliano, G.W. Trotter, and guest speakers
Contact: www.csuequine.com, equinesc@colostate.edu, 970-491-8509

Medical Acupuncture for Veterinarians
Dates: Jan. 16-19, 2003; Feb. 20-23, 2003; March 27-30, 2003; April 24-27, 2003; May 29-June 1, 2003
Fee: $4,250 for veterinarians and veterinary students; $3,200 for veterinarians with previous acupuncture training.
Instructors: Drs. Narda G. Robinson, Joe Stricklin, Gayle Trotter, Deke Kendall, David Lowell, Mark Mattison, Leslie East, Kim Vanderholm, Pamela Muhonen, Cynthia Wallis, Priscilla Dressen.
Contact: www.aavma.org, equinesc@colostate.edu, 970-491-8509

Veterinary Students Hold Second Annual Dog Health Day

Dog owners throughout Northern Colorado got special attention for their best friends while making a donation to a worthy cause during the second annual Dog Health Day September 14 at Colorado State University's James L. Voss Veterinary Teaching Hospital.

Organized by students in the Professional Veterinary Medical Program, Dog Health Day benefited the American Veterinary Medical Foundation's VMAT teams, the emergency veterinary teams who fly into disaster areas to provide medical support for injured animals and for the search-and-rescue dogs often used in such situations. The event also benefited the local CSU/Fort Collins Community Pet Hospice Program, which provides end-of-life homecare for pets and emotional support and education for their families. At this year's event more than $5,000 was raised.

Veterinary services offered during the day for a suggested donation included physical exams, dental exams, nail trimming, dog washing, behavior problem information, and more. Participants also had the chance to take home a variety of products in exchange for a contribution. Services and gift certificates donated by local businesses were raffled during the day. Donations came from Foot of the Rockies, Carmike Cinemas, Richie's Express Carwash, the Texas Roadhouse restaurant, and the Wherehouse.

Dr. Cynthia Johnson, a member of VMAT 3, was on hand to demonstrate how a veterinary MASH unit operates in a natural or manmade disaster, discuss the type of physical and mental preparation necessary to qualify for such a team, and explain the special medical and survival gear each team member must be prepared to carry in and out of disaster areas.

Other local groups offered demonstrations throughout the day including Mike Manzo of the Longmont Fire Department and his fire forensic specialist dog "Shadow" who, by sniffing the site of a fire, can help determine its origin; the Fort Collins Police Department's K-9 Unit; and the Rocky Mountain Search and Rescue Team. Dog Health Day was organized last year after the events of September 11 to raise money for the Heroes Fund.

Mycobacteria Researcher Elected to Prestigious Academy

Professor Ian M. Orme, Director of Mycobacteria Research Laboratories in the Department of Microbiology, Immunology, and Pathology, has been elected a fellow in the American Academy of Microbiology. Dr. Orme is one of only 1,700 scientists elected to a fellowship in the 47-year history of the organization.

Members of the American Academy of Microbiology (AAM) are elected by their peers through a highly selective, annual evaluation process and admitted to fellowship based on records of leadership and outstanding, original work that has advanced the microbiological sciences. Academy fellows represent 35 countries and all subspecialties of microbiology, including basic and applied research, teaching, public health, industry, and government service.

"We are exceptionally fortunate to have a researcher of Dr. Orme's caliber here at Colorado State," said Dr. Perryman, Dean of the College. "Dr. Orme's research work, particularly in the field of tuberculosis, is helping to create hope in communities ravaged by diseases caused by Mycobacterium."

Dr. Orme is particularly known for developing a mouse model for the study of tuberculosis that is now widely used in TB vaccine development and drug screening, and he has made important contributions to understanding the mechanisms at work in immunity to tuberculosis.

American research on vaccines and anti-TB drugs almost ceased a few decades ago as public health officials assumed the disease was on the way to becoming completely eradicated. However, tuberculosis is now the leading bacterial killer in the world, with 10 million new cases and 3 million deaths each year. It is resurgent in developing countries and, in America, in prison populations, among the homeless, and in HIV/AIDS-infected patients. A factor in its return, and one of particular concern to Dr. Orme, is that some TB strains are resistant to several anti-TB drugs.

Most recently, Dr. Orme and his team have worked with broad-spectrum antibiotics in the fluoroquinolone class to discover a drug that is effective in fighting latent tuberculosis without creating drug resistance. The researchers hope to combine the drug with other drugs already in use to possibly shorten the course of treatment, reduce the dosages and side effects, and provide a new treatment option at a lower cost. ■

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