RUTGERS UNIVERSITY
# EQUINE SCIENCE QUARTERLY


## Inside the Issue:



# From East Coast To West Coast & Back Again, A Journey Of Scientific Discovery

The Equine Science Center faculty, students, and alumni at the 2019 Equine Science Society Symposium, hosted by North Carolina State University in June. The Rutgers' delegation included 10 members, of which alumni included an industry scientist, a feed representative, an Extension Educator, a distinguished researcher, and ESS President, Kenneth McKeever, pictured on the right.

Sitting at his desk in the basement of Bartlett Hall, Dr. Kenneth McKeever is surrounded by pictures of colleagues at conferences, a stand of collegiate hats from students who have gone on to receive master's or terminal degrees at other universities, and what might be one of the most interesting and yet unnoticed items if you haven't heard the story behind it.

Framed on a wall that contains just some of his many awards hangs a smaller frame than most of the others.

Inside of it, on a small card, is documentation for McKeever's Silver Palm, the highest degree awarded to an Eagle Scout in the Boy Scouts of America organization.

Once you have completed the rank of Eagle Scouts, Palms are a higher degree added to those who continue to earn additional merit badges, each additional 5 badges adding an additional Palm.

Growing up McKeever

Continued on pg. 10

RUTGERS
New Jersey Agricultural Experiment Station

# From The Clubhouse

**I hope to see all of you at the "Evening of Science & Celebration" on November 14th at the Cook Student Center!**

*Dear Friends,*

*The fall semester began after Labor Day with a rush here at the Equine Science Center. I hope everyone had time over the summer to relax a bit and to spend quality time with your horses!*

*For the first time in over 40 years I find myself co-teaching a formal full semester course "Topics in Equine Science" with Ken McKeever. The students are all majors in Animal Science but few have extensive horse experience.*

*I find myself enjoying "talking science" with the very engaged students and Professor Ken McKeever. Ken and I have broadened the scope of the class beyond exercise physiology and have included several outside speakers, as well.*

*On August 2, the Center hosted an alumni reunion event in conjunction with the annual Hambletonian Veterinary Conference dinner. The event was hosted by RUBEA co-chair Amy Butewicz and featured special guests Governor Richard Codey and Jeff Gural, Chair and CEO of New Meadowlands Racing and Entertainment. Mr. Gural welcomed the group of over 30 Rutgers alumni and friends of the Equine Science Center.*

*Once again the weather cooperated and we had a lovely summer evening on the Upper West Deck of the racetrack watching top quality horses compete on the day before the Hambletonian. To see some of the great photos from the night, take a look at* ***Page 4****.*

*On September 21, Center faculty, students, and staff joined the Landy family at Freehold Raceway for the 8th annual Open Space Pace Parade and Festival of Horses. As they did last year, the Rutgers Seeing Eye Puppy Raising Club marched in the parade and spent the day with us tabling at the racetrack.*

*Graduate students Ellen Rankins and Jen Weinert, and undergraduate student Jenna Lorippo were all winners of $1,000 scholarships; and the Equine Science Center also received a $1,000 check in recognition for its work to ensure that horse racing remains a sustainable part of agriculture in New Jersey. To learn more about the day visit* ***Page 6****.*

*On November 14 the Center will host its annual "Evening of Science and Celebration" sponsored by Mid-Atlantic Equine Medical Center. This year's keynote address is by our own Ken McKeever and is a must hear for anyone involved in horse racing. The talk is titled "A New Treatment for EIPH: The Effects of Phosphodiesterase Inhibitors on Pulmonary Artery Pressure in Horses.*

*We also will be presenting the "Spirit of the Horse" award to Dr. Michael Fugaro, and the Gold Medal Horse Farm award to Fair Winds Farm. To learn how to register see the flyer on* ***Page 15****.*

*On the following Saturday, November 16, the Center will host its second wet lab for the New Jersey Association of Equine Practitioners. Sponsored by Boehringer Ingelheim and Universal Imaging, the day-long program at the Equine Exercise Physiology Lab will feature hands on training in joint injections. These wet labs qualify for continuing education credits for veterinarians, and the first wet-lab last year was well received. For registration information, please visit* ***Page 25****.*

*I look forward to seeing you all soon at the "Evening of Science and Celebration"!*

*All the Best,*
*karyn*

# Partners

**New Jersey Farm Bureau**'s primary purpose is to represent the overall interests and improve the financial well-being of farmers and our $800 million industry. NJFB activities are supported through voluntary membership and annual dues. Members have access to:

- Staff assistance on farming issues and regulatory problems.
- Educational workshops on topical issues such as farm labor, wildlife damage, and zoning.
- Weekly updates on legislation news and regulations affecting all aspects of farming.

It pays to be a NJ Farm Bureau member! For a full list of membership levels and benefits, or to sign up, visit: www.njfb.org.

**UMH Properties, Inc.**, is a real estate investment trust that owns and operates manufactured home communities in seven states throughout the northeast.

UMH has been in business since 1968, operating as a public company since 1985. Owning a portfolio of over 90 manufactured home communities, housing approximately 15,700 home sites.

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For more information about UMH Properties, Inc., please visit: www.umh.com

**The New Jersey Department of Agriculture (NJDA)** is an agency which oversees programs that serve virtually all New Jersey citizens. One of the Department's major priorities is to promote, protect and serve the Garden State's diverse agriculture and agribusiness industries.

In addition to the programs we offer to support production agriculture, NJDA also manages programs that feed schoolchildren, distribute surplus federal foods to soup kitchens and pantries that serve our needy citizens, conserve precious soil and water resources, protect farmland from development and preserve it for future agricultural use, expand export markets for fresh and processed agricultural products, and promote our commercial fishing industry, and administer the complete program of agriculture, food and natural resource education, which includes the State FFA Association.

For more information about NJDA, please visit: www.nj.gov/agriculture

# Upcoming 2019 - 2020 Events

**Evening of Science & Celebration**

*Thursday, November 14, 2019*

Cook Student Center
Rutgers, The State University of NJ
New Brunswick, NJ

***kylehart@njaes.rutgers.edu***

**NJAEP Ultrasound Wet-Lab For Veterinarians**

*Saturday, November 16, 2019*

Rutgers University
Cook Campus Farm - Red Barn
College Farm Road

***NJAEPmail@gmail.com***

**Horse Management Seminar**

*Sunday, February 9, 2020*

Cook Student Center
Rutgers, The State University of NJ
New Brunswick, NJ

***esc@njaes.rutgers.edu***

**Junior Breeders Symposium**

*Saturday, March 28, 2020*

Cook Farm
Rutgers, The State
University of New Jersey
New Brunswick, NJ 08901

***carey.williams@rutgers.edu***

For more events, visit our website @ esc.rutgers.edu

# Equine Science Center Alumni Reunion

On August 2, the Equine Science Center held an Alumni Event to coincide with the 2019 Hambletonian Veterinarian Seminar.

The seminar concludes each year with a dinner hosted by First Choice Marketing at the Meadowlands Racetrack. This dinner serves as a thank you to all of the attendees.

This year the Equine Science Center co-hosted the dinner, inviting Alumni (and a few special guests) to the dinner for a fantastic night of racing and networking.

Special guests included Governor Richard Codey, members of the Rutgers University Board for Equine Advancement and their guests, as well as a special welcome by Jeff Gural.

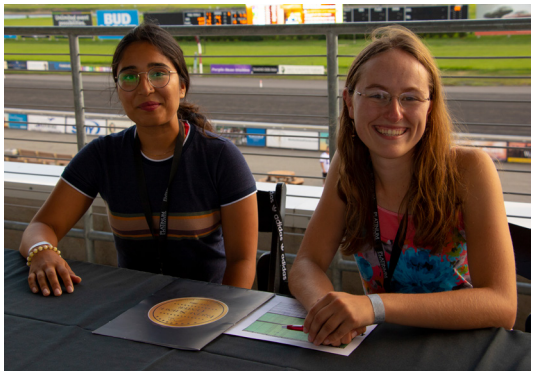
Mr. Gural, the Chair and CEO of New Meadowlands Racing and Entertainment, welcomed guests to the venue, and gave a brief history of racing in New Jersey, and its importance to the New Jersey economy.

Both Governor Codey and Mr. Gural thanked the Equine Science Center for providing the scientific data that helped to show the importance of the equine industry to New Jersey.

The alumni were thrilled to come back and reunite, and look forward to the next event.











MetLife


# Open Space Pace

## Sees The Return Of The Seeing Eye Puppies!

The 2019 Open Space Pace took place on Saturday September 21st, at Freehold Raceway.

This year the Rutgers University Seeing Eye Puppy Raising Club joined us for the second year in a row, much to the crowd's delight.

Club members, including 3 puppies which are currently a part of the training program, joined the Center as volunteers and staff marched down the streets to bring awareness to Open Space in New Jersey.

Following the parade was a fun filled day of racing, food vendors, live music, petting zoos and so much more.






The Center tabled throughout the day, giving away the always popular horse sports bags promoting the "Equine Science 4 Kids" program.

While kids were excited to receive the sports bags, having a few puppies at the table didn't hurt the Center's turnout.

Three students from Rutgers University received $1000 scholarships as a part of the scholarship raffle that took place throughout the day, including both of the Center's graduate students!

The Center can't wait for next year's Open Space Pace, and will have some new give-a-ways as we plan on rolling out a few surprise updates to our Equine Science 4 Kids program!

**Be sure to take a look at all of the fantastic pictures from the day!: http://bit.ly/OpenSpacePace2019**

# From East Coast To West Coast & Back Again, A Journey Of Scientific Discovery

Continued from Pg. 1

always had a fascination with seeing how things worked, how pieces connected to one another, and what made something tick.

He recalls as a child trying to figure out how clocks worked and taking them apart to see how the gears turning interacted with one another. The problem here was that once the clock was apart, he couldn't seem to put it back together; "that didn't work" he recalls, "there were parts [still] on the floor."

But it would be this fascination with trying to figure out how things worked that set him on a path to become a scientist, to investigate.

During his high school years, he participated in the Air Force JROTC program. At a time when a large number of high school and college students were participating in war protests, and the country was facing what some would call an anti-military movement, McKeever would be dressed in full uniform at least once a week.

His feeling of duty and service to something greater than himself already starting to show through. Thinking back to this time, he recalled that whereas some of his fellow cadets had purchased the shoes that had that glossy look to them purely by the nature of what they were made of, he would shine his own shoes before inspection, sometimes taking an hour or longer to do so, an attention to detail that he took pride in.

McKeever also lettered in swimming and water polo a sport that is endemic in Orange County. CA.

His water polo career started after being told that he was too big to play football. Fate had it that they were playing water polo in his physical education class where McKeever got into the goal and promptly made two face saves. The athletic director promptly recruited him for the water polo team and in his senior year he was named as a goalie on the all-Orange League team.

After high school McKeever would go on to California State Polytechnic University Pomona, studying in the Department of Animal Science. Like many of his fellow undergraduate students McKeever thought about becoming a veterinarian. He enjoyed the science and loved working with animals, but his other passion, water polo, kept him from getting the grades that he believed he would need to enter into vet school.

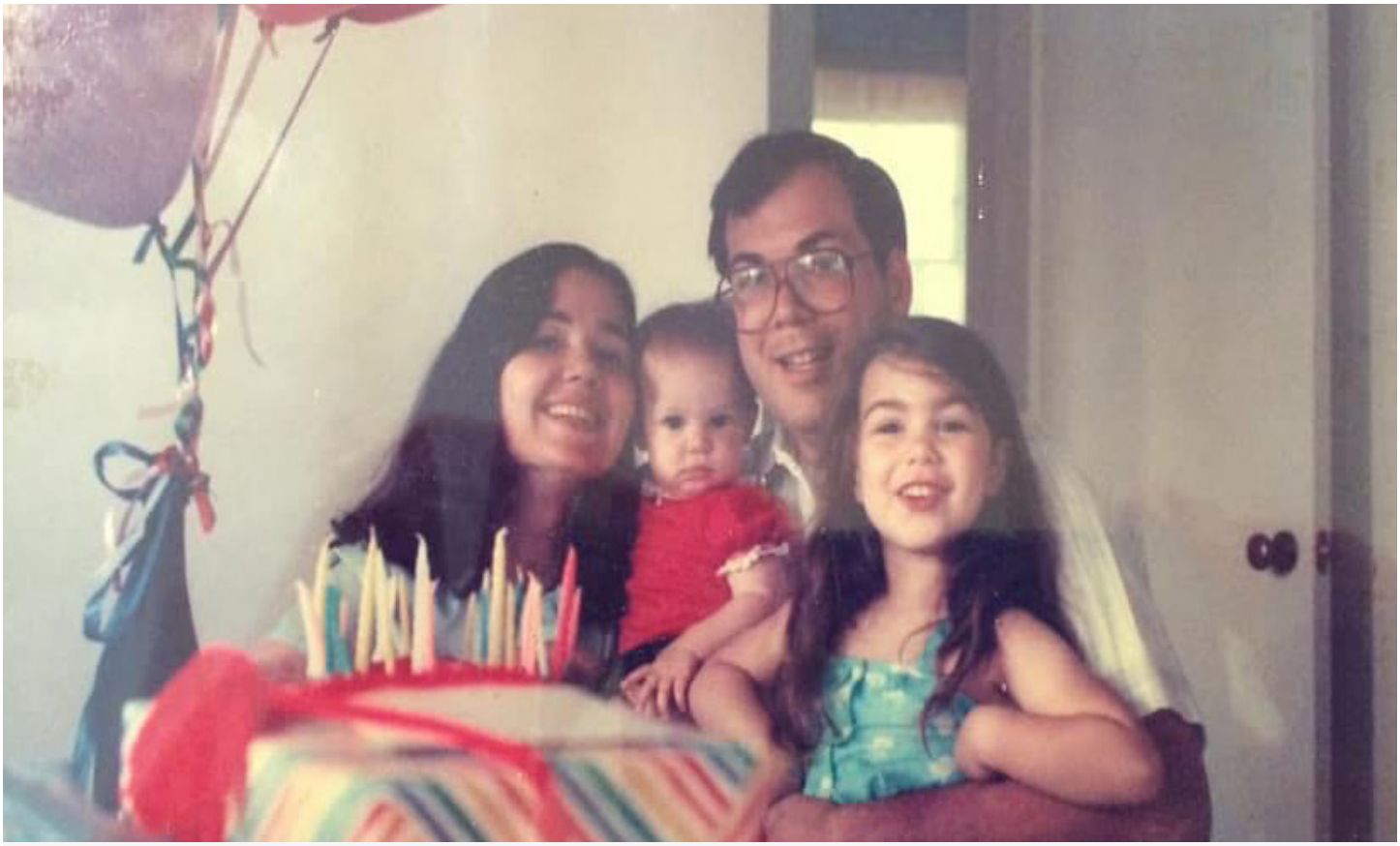
Playing in both high school and college, even earning four varsity letters in college for the sport, water polo has become a lifelong passion. A passion that continues to this day as he play at a national and international level as a Masters athlete.

But while spending six hours a day six days a week in the pool kept him from getting the grades he would need to enter into vet school, it did focus him on a passion for understanding the physiology of exercise.

Even though his undergraduate degree was in animal sciences, he worked with almost every animal that you could think of on a farm besides horses. Somehow, it wouldn't be until his master's work that this would change.

As it started to get closer to graduation, McKeever started to look into master's programs, acknowledging that vet school might potentially be down the road, just not yet.

Whittling down his options to two schools, he ultimately settled on the program at Fresno State University. He recalled that Dr. Gary Heusner, the head of the equine program "needed someone that was 'big and



McKeever celebrating his 30th birthday during his time in San Mateo, California working for the National Aeronautics and Space Administration (NASA) - Ames Research Center. His placement was specifically at the Cardiovascular Research Lab in Mountain View California.

naive' to wrestle the babies and mommas" to take body measurements and blood samples every week. This would be the start of his master's work to determine how the month of birth and the age of the dam affected the growth rates of foals.

As graduation approached yet again McKeever married the love of his life, Jennifer. And, towards the very end of his work at Fresno, McKeever found an opportunity to hone his skills with horses as the assistant manager at Post Time Thoroughbred ranch in Tulare.

Horses seemed to be in his future, and while working there he was informed by Heusner that they might be looking for someone to manage the horse farm and the breeding program at the University of Arizona while also doing doctoral work in animal physiology.

And so off he went. Now married, the McKeevers moved to Arizona. There his Ph.D. work would focus on the effects of exercise training on the expansion of plasma volume and the adaptive response to training that occurs with the cardiovascular system.

He partnered with Dr. Vic Convertino, who had been doing this type of work in humans at NASA. The partnership was one that taught McKeever a great deal, especially how to think like a physiologist and to design complex comparative and integrative experiments focused on whole body responses to the challenge of exercise. They used dogs and horses as their model, which allowed them to better control potential variables and to take measurements not easily done in humans.

McKeever would graduate with his Ph.D. in 1984. He fondly remembers his oldest

daughter Nicole and wife Jennifer cheering him on at his graduation!

"As the Roman philosopher Seneca said 'Luck is when preparation meets opportunity,'" said McKeever, "and that preparation would open the door to the next phase of my research career."

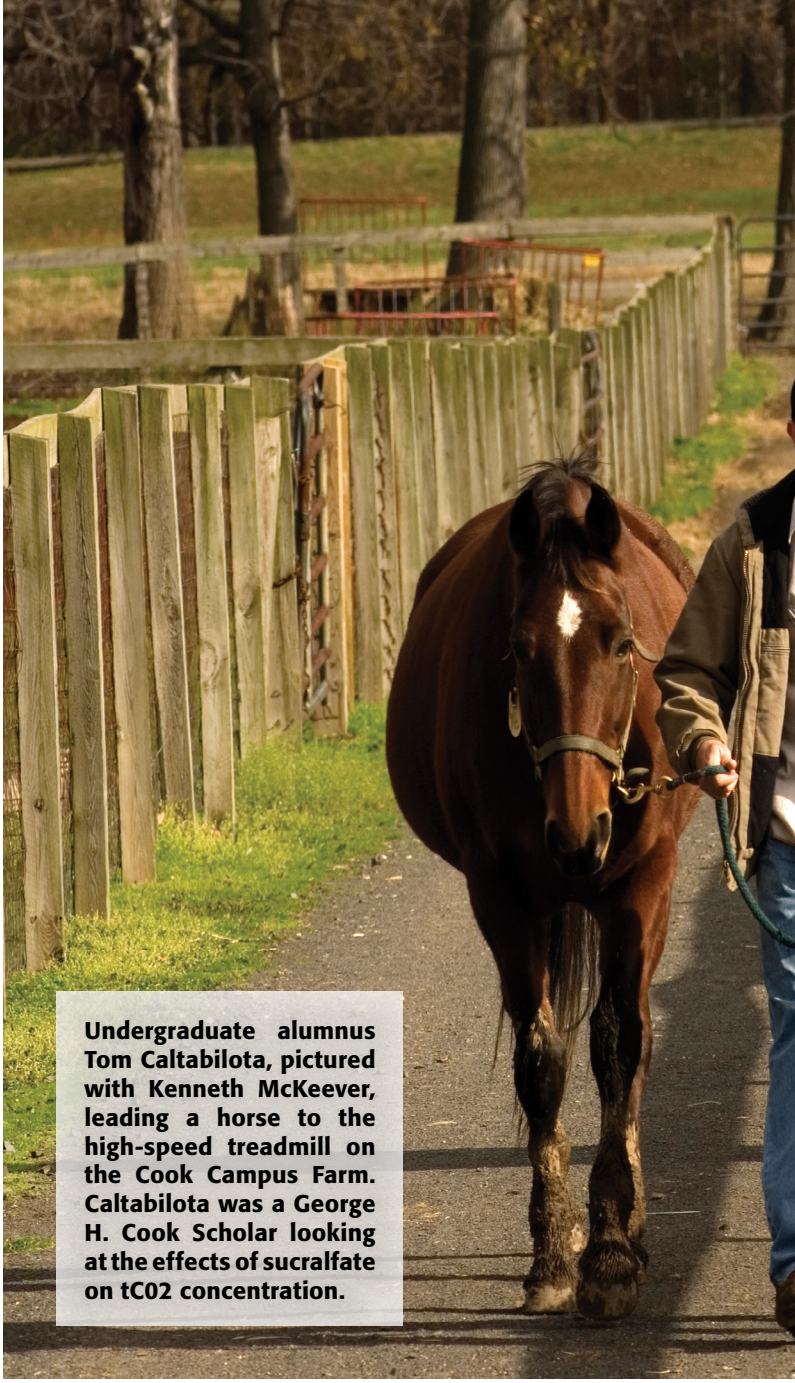
His mentor Convertino heard that Dr. Hal Sandler, the Chief of Biomedical Research at the National Aeronautics and Space Administration (NASA) was looking for a NRC-NASA Post-Doc, and even though he immediately thought of McKeever, some unforeseen consequences put the Post-Doc position on hold for a few months. While waiting to hear back about the Post-Doc, McKeever would take another career detour, this time into the world of substitute teaching.

Working as a substitute teacher McKeever recalls his time teaching students from a plethora of different grades. "If you have ever seen 'Kindergarten Cop,' I felt like that movie," said McKeever, "with the kids that were in second grade looking at this 6'4" dude with expressions that said 'like who is this giant?'"

While he found the work rewarding, and actually enjoyed teaching, he missed being in the lab. Right before taking another teaching position, his Post-Doc position finally came through.

The Ames Research Center at NASA would become McKeever's home for the next two years continuing his work with cardiovascular and exercise physiology. Here he would use the monkey as an animal model looking at the effect of simulated weightlessness on the control of blood pressure and blood volume.

"So, when you go up into outer space, there is a reflex where the blood shifts back towards your heart and head," says McKeever, "the heart senses that, and signals to the body to get rid of the extra fluid." This causes the subject to increase urination as a way to manage this "extra fluid" that the body has interpreted.



**Undergraduate alumnus Tom Caltabilota, pictured with Kenneth McKeever, leading a horse to the high-speed treadmill on the Cook Campus Farm. Caltabilota was a George H. Cook Scholar looking at the effects of sucralfate on tC02 concentration.**

Other experiments included tests that could be accomplished on the ground. Simulations which could be done instead of spaceflight due to the pause in U.S. spaceflight after the tragedy of the Challenger Shuttle.

As McKeever neared the end of his Associateship position, he found himself working late one night at a second job.

While the prestigious position of being a National Research Council Post-Doc for NASA was mentally enriching…the pay wasn't all that great, especially for McKeever's family which now included a second daughter Natalie.

So, moonlighting at a local vet clinic, he cleaned, polished, and shined the floor (a process that took close to 4 hours due his attention to detail). One particular night that McKeever recalls was no different than the rest, as during his break he found himself looking at the veterinary magazines and journals as the floor dried.

A nightly occurrence, he would turn to the jobs section and see what positions were open. As he eyed down the page, he came across a posting that would change his life, a position to build the Equine Exercise Physiology Lab at The Ohio State University.

Applying for the job, and eventually being hired, McKeever would build the fourth equine exercise physiology lab in the country with a high-speed treadmill. While he was hugely successful with the papers and articles that would come out of his lab, the position wasn't tenured so he would again start to look for another position.

Returning to his home-state of New Jersey, McKeever was hired at Rutgers University in the Department of Animal Sciences at a time when Karyn Malinowski was working to build up the equine program.

Converting a part of the Cook Campus Farm from land that was used for pigs, the equine exercise physiology program stated to take shape. "Exercise physiology is something that flowed from a lifelong playing water polo," said McKeever, "trying to figure out all of the aspects of what makes a great equine athlete, it's always been a passion." It would be this passion that led him to create yet another high-speed treadmill lab, this time for Rutgers.

Pouring the concrete pit that the treadmill would sit on and working with a team to roll the 27-foot treadmill into the pit using telephone poles to create a conveyer belt of sorts, McKeever would with his own two hands help dig the pit, pour the concrete, and whatever it took build this program in a very short time frame.

Credited as one of the only schools in the world that has an equine high-speed treadmill that isn't used as part of a vet school, his lab would give hands on experience to undergraduate students.

Continued on Pg. 14

For Release

Lab Notes - McKeever

The High-Speed Treadmill is used to simulate race conditions with less variables than that of exercising on an actual racetrack.

# From The Lab:

## Effects of a Type-5 Phosphodiesterase Inhibitor On Pulmonary Artery Pressure In Race Fit Horses

Malinowski's Lab

Collaborators from other Universities

McKeever's Lab

Horse Treadmill

Williams' Lab

## The Top 5 Take-A-Ways

**#1**

**Although exercise induced pulmonary hemorrhage (EIPH) has been recognized for decades, and research has shed light as to why horses bleed during strenuous exercise, there is no consensus regarding the true cause of EIPH.**

**#2**

**The main controversy surrounding the use of furosemide (Lasix) in racehorses is whether the drug actually enhances a horse's performance ability independent of any effect on the severity of bleeding.**

Although exercise induced pulmonary hemorrhage (EIPH) has been recognized for decades, researchers still have more questions than answers when it comes to the cause and prevention of this problem.

The main controversy surrounding the use of furosemide (Lasix) in racehorses is whether the drug actually enhances a horse's performance ability independent of any effect on the severity of bleeding.

Horses lose weight after receiving furosemide four hours before race time. Lasix also has an alkalinizing effect that has the potential to alter the acidosis seen with intense exercise. Together, these effects can result in an exercise performance advantage over horses not receiving furosemide.

Because EIPH is believed to be caused by an increase in blood pressure during strenuous exercise, treating the horse prior to racing with an agent that actually lowers blood pressure would be ideal.

This study was performed to determine the optimal dose and timing of E4021 to reduce pulmonary artery pressure (PAP) during treadmill exercise. Eight unfit Standardbreds were conditioned with speed and duration increased weekly until weeks 12-14, when three treadmill Graded Exercise Tests (GXT) were performed to document stable fitness ($VO_2$max).

Two randomized crossover experiments then used Simulated Race Tests (SRT) to determine the optimal dose and timing of IV administration of E4021 prior to exercise.

In the first experiment, researchers evaluated the effect of two doses of the drug (50 versus 100 mg) and administration at two time points (45 versus 90 minutes prior to exercise) and compared this to the control group which received no drug.

In experiment 2, all treated horses received drug treatment at 90 minutes prior to exercise, compared to the control group which received no drug. The effect of three drug doses were compared: 100 mg; 150 mg; or 200 mg.

The major finding was that the 100 mg dose administered 90 minutes before exercise resulted in the lowest pulmonary artery pressure. In experiment 2, increases in the dose of the drug given 90 minutes prior to exercise did not result in further decreases in pulmonary artery pressure confirming that 100 mg was the optimal dose.

While E4021 did lower pulmonary artery pressure when given at the dose of 100 mg 90 minutes before exercise, it did not alter markers of aerobic or anaerobic performance.

The reduction of pulmonary artery pressure of approximately 30 mmHg seen with 100 mg dose at 90 minutes prior to exercise represents a clinically significant effect.

**#3**

**The 100 mg dose administered 90 minutes before exercise resulted in the lowest pulmonary artery pressure.**

**#4**

**Because EIPH is believed to be caused in part by an increase in blood pressure during strenuous exercise, treating the horse prior to racing with an agent that actually lowers pulmonary artery blood pressure would be ideal.**

**#5**

**While E4021 did lower pulmonary artery pressure when given at the dose of 100 mg 90 minutes before exercise, it did not alter markers of aerobic or anaerobic performance.**

# From East Coast To West Coast & Back Again, A Journey Of Scientific Discovery

Continued from Pg.11

As students who have gone on to vet school come back to attest, their peers look on in disbelief as they are able to simple procedures like put in a catheter or take blood samples. It is this hands-on experience that McKeever provides that makes Rutgers undergraduate students so competitive for vet school.

McKeever's most current work, oddly enough, had him working on research similar to that of his days at NASA. Lasix, a drug used to treat exercise induced pulmonary hemorrhage (EIPH) in racehorses, also has the effect of decreasing blood pressure and causing the horse to urinate (and lose up to fifty pounds of water weight) right before a race.

McKeever looked into other drugs that would have the effect of lowering blood pressure, thus reducing the chances of EIPH in the horse, while at the same time not having the diuretic effect of Lasix (something that can be seen as a competitive advantage). He will present this research at the Equine Science Center's 2019 "Evening of Science & Celebration" on November 14th.

His next project will be co-advising doctoral candidate, Ellen Rankins, with Malinowski (who since helping to hire McKeever went on to become the founding director the Equine Science Center at Rutgers University).

Rankins's work will focus on the Effect of Equine Assisted Activities & Therapies (EAAT) on Veterans with Post Traumatic Stress Disorder (PTSD).

In his spare time McKeever stays active with water polo, most recently traveling to California for a match this summer.

He enjoys gardening; working on his family's genealogy (holding membership to multiple societies including those with ties to the American Revolution, and the founding of New Jersey); as well as spending time with his wife Jennifer, two daughters Nicole and Natalie, and (who he sometimes refers to as his third daughter) Nora, the family dog.

McKeever talking to a historian during the reenactment battle of The Battle of the Assunpink Creek (also known as the 2nd Battle of Trenton). McKeever's 6th great-grandfather Lt. Colonel Fredrick Pope fought at both battles of Trenton, with his son Sgt. Ralph Pope.

## The Equine Science Center

# Evening of Science & Celebration

**Thursday, November 14th, 2019**
**6:00pm to 9:00pm**

### Keynote By Dr. Kenneth McKeever

*"A New Treatment For EIPH: The Effect of PD Inhibitors On Pulmonary Artery Pressure in Horses"*

## *Program Highlights*

Buffet Dinner
4-H Roundup Team Presentation
Keynote Presentation
Gold Medal Horse Farm Award
Equine Science Center Presentations
Spirit of the Horse Award

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To register, please go on-line to **http://bit.ly/2019Evening**
Event fee: $35 for adults & $15 for full-time students
Please remit payment to: Rutgers Equine Science Center
57 US Highway 1, New Brunswick, NJ 08901


# Wine & Equine

Department of Animal Sciences Extension Specialists, Carey Williams and Michael Westendorf, hosted Equine Extension Specialists from across the country at a regional meeting for the U.S. Department of Agriculture Multi-State project NE-1941: Horses and the Environment.

This annual gathering, now in its 10th year, provides a forum for sharing research related to sustainability of equine operations and strategies for communicating these advances to the public and stakeholders.

This year's meeting included a "Wine and Equine" event, hosted by Cream Ridge Winery, on Tuesday, August 20th.

This event was open to the public and featured talks by Extension Specialists from the University of Maine (Robert Causey), University of Minnesota Equine Extension Program (Krishona Martinson), Equine Studies at the University of Maryland (Amy Burk) and UMass Amherst (Masoud Hashimi) as well as Rutgers University Ph.D. Candidate Jennifer Weinert and representatives from the New Jersey NRCS.

These talks covered a wide variety of topics related to horse, farm, and pasture management.

This was the first year that the NE-1941 meeting included a "Wine & Equine" event, and attendees were happy to be able to discuss their questions with specialists from around the country.

**For more pictures from the Wine & Equine event, please visit:**
**http://bit.ly/2019WE-NE1941**

# BIOSECURITY

## How To Protect The Farm

A special report by Francesca Buchalski, undergraduate student from the Department of Animal Sciences at Rutgers University

With many year-end horse shows fast approaching, it's more important than ever to be mindful of the spread of equine illnesses.

One of the best ways to prevent pathogens from invading your farm is to implement an effective biosecurity plan. An effective biosecurity plan works to prevent and control the spread of pathogens.

While these plans might seem intricate and overwhelming at first, USDA District Epidemiology Officer Dr. Leslie Seraphin explains that a biosecurity plan essentially boils down to "no germs in, no germs out."

## Step One: Keeping Germs Out

The first line of defense in an effective biosecurity plan is preventing pathogens from entering your property in the first place.

One of the best ways to accomplish this is to keep unwanted visitors from coming in. Keeping a fence around areas housing horses, preferably with a sign discouraging unauthorized people from entering, can deter people (and some animals) from coming into contact with the horses.

It's also important to make sure that all visitors and authorized personnel do not bring any pathogens onto the farm; it's a good idea to have all people disinfect their shoes and hands before entering the barn.

A foot bath and hand washing station set up at the main entrances of the barn is an excellent way to accomplish this.

Horses themselves can bring pathogens to the barn as well. If your horses leave and return to the property, or if new horses are integrated into your herd, it's important to have an isolation area set up.

Ideally, an isolation stall will have no shared airspace with other stalls, and should have its own exclusive equipment and materials; any people working with a horse in isolation should disinfect their hands and shoes, as well as change their clothes, before and after interacting with the isolated horse.

If an isolation stall is not an option, an isolation lot or paddock is a good alternative. When the Rutgers research herd welcomes some new horses later this year, they will initially be housed in an isolation paddock to prevent any pathogens from being transmitted to the rest of the herd.

**As a part of the "Topics in Equine Science" course under the Department of Animal Sciences, professors Karyn Malinowski and Ken McKeever invited guest lecturer Dr. Leslie Seraphin to give a talk about biosecurity and what to look for to ensure proper biosecurity measures on different types of locations. Professor Malinowski and McKeever then took the students on a tour of the Cook Campus Farm to grade how well the farm rated on personalized risk assessment test.**

**At the Cook Campus Farm all hay is moved by hand, or via truck depending on the distance. The buckets and wheel-barrels pictured above are only used to clean stalls and remove waste, helping to ensure that the horses food source doesn't get contaminated with manure or other pathogens.**

# Step Two: Stopping Germs from Spreading

Even with biosecurity protocols in place to prevent pathogens from entering your property, it's likely that some will slip past that first line of defense.

It's important that your barn environment is not facilitating the spread of these pathogens. If your barn uses wheelbarrows to feed hay as well as muck stalls, use separate wheelbarrows for hay and manure. This way, any pathogens present in manure will not be ingested by horses eating contaminated hay.

Dr. Seraphin also points out that wash stalls are often notorious pathogen-friendly environments—a damp area combined with shared equipment and multiple users, both human and equine.

Make sure that all drains are functioning properly to eliminate standing water, and keep hoses and other equipment off the ground.

Any dirt or manure on the floor or walls should be washed, and crossties or ropes disinfected before use.

If your stalls have drains, make sure the runoff does not come into contact with other horses.

It is also important to consider that vectors such as mosquitoes and ticks can transmit a variety of diseases.

While eradicating all vectors is not realistic, there are measures you can take to significantly reduce their numbers, and in turn, reduce vector-facilitated disease transmission.

Eliminating standing water, keeping pastures mowed, cutting back bushes on fence lines, and preventing wildlife from entering the property are all effective methods to reduce the number of vectors coming into contact with your horses.

**Dr. Seraphin met with Francesca to do a private walk through of the farm pointing out potential risks, as well as the measures that have been put in place that are beneficial. Pictured below Dr. Seraphin complemented the farm staff's work of keeping the grass trimmed near the fence line, an area is sometimes overlooked. Dr. Seraphin often finds that this is a perfect environment for ticks to gather.**

# Step Three: Keeping Your Horse Healthy

Just as with healthy people, healthy horses are better equipped to fight off invading pathogens. "One of the best biosecurity measures you can take is to keep your horse healthy," says Dr. Seraphin.

Here are some simple strategies you can implement with your horse to give it the best chances of fighting off infections.

## *Know your horse's individual temperature*

While the "normal" temperature range for a horse is between 99 and 101.5 degrees Fahrenheit, different horses often have individual "normal" temperatures within this range.

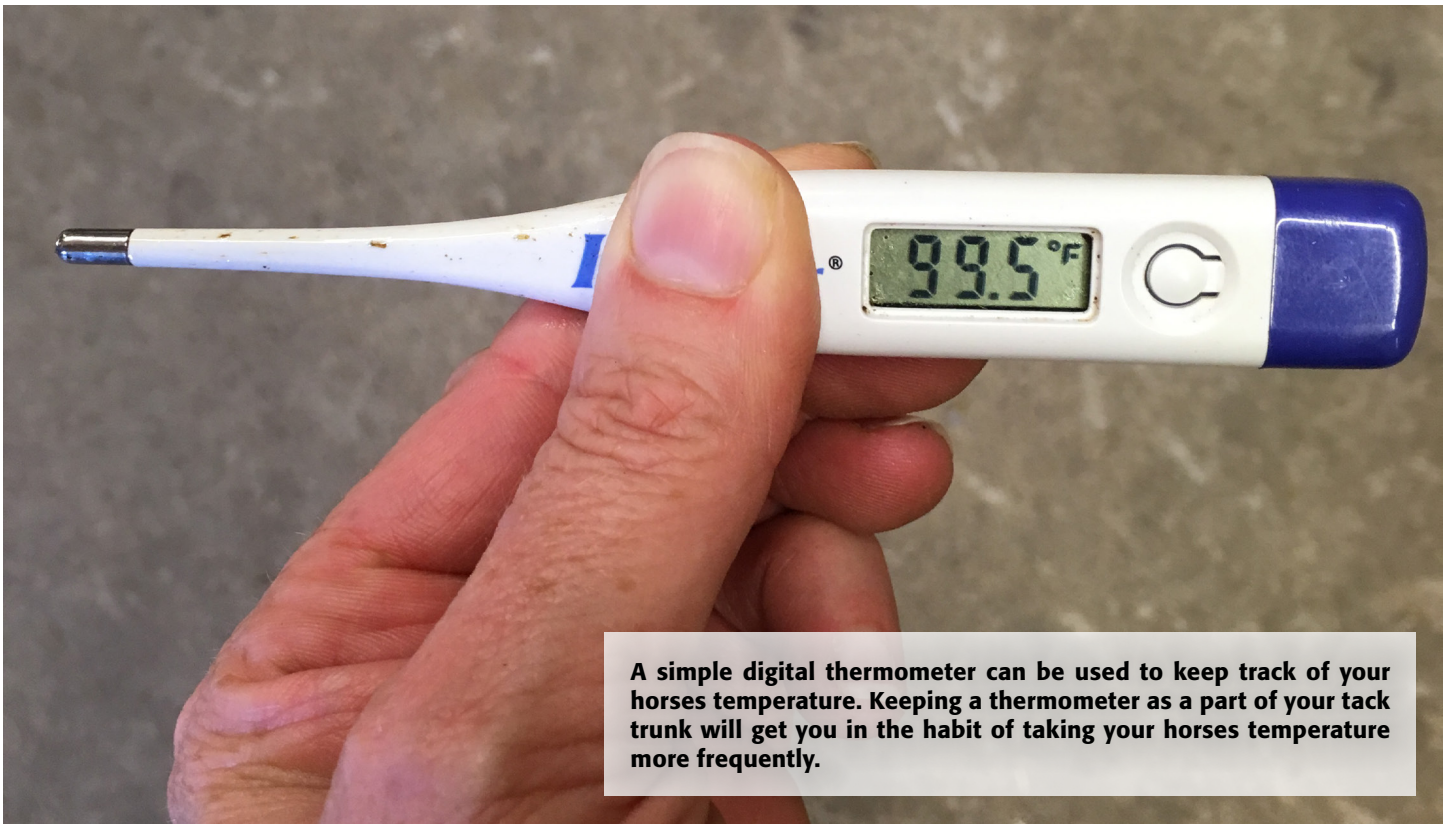
Knowing your horse's temperature patterns can help you determine whether an infection might be setting in before your horse begins showing obvious clinical signs.

"A temperature of 101 is considered to be within the normal range," says Dr. Seraphin, "but if I know that a particular horse usually runs around, say, 99.5, then a temperature of 101 might indicate that there's an infection brewing."

"Horses shed the highest [pathogen loads] about 24 hours before they show obvious clinical signs; the only indication you might get at this stage is a slight spike in temperature," she continued, "about half a degree to a degree higher than that horse's normal temperature."

It's a good idea to get in the habit of taking your horse's temperature every time you go to the barn so that you become familiar with what's normal, and so that you can quickly take action if the temperature is abnormal.

Keeping these records of what is considered "normal" for your horse creates a baseline of information for you to check against when you think your horse might have a fever.




**A simple digital thermometer can be used to keep track of your horses temperature. Keeping a thermometer as a part of your tack trunk will get you in the habit of taking your horses temperature more frequently.**

## Good Nutrition

Finding the appropriate balance of nutrients is essential for maintaining a horse's health.

Different horses have different nutritional requirements based on breed, lifestyle, and other factors such as Equine Metabolic Syndrome.

If you are unsure of what nutrients your horse should be receiving, talk with your vet or an equine nutritionist to develop a nutrition plan for your individual horse.

## Reduce stress

Stressed animals, including horses, are far more susceptible to diseases than their non-stressed counterparts.

A walkthrough of your horse's environment can tell you a lot about potential stressors to your horse.

Does your horse always have access to clean water and shelter, or do its pasture buddies push it away from these resources?

Could your horse care less about vehicles and noises from nearby roads, or does it spook at every passing bicycle?

If possible, take measures to reduce such environmental stressors.

## If your horse is sick, isolate

Upon seeing an obviously ill horse, it's many people's first instinct to immediately call the veterinarian.

However, even before calling the veterinarian, you should isolate the sick horse; otherwise, you risk further spreading of the disease to other horses on the property.

After your horse is isolated from the rest of the herd, it's also a good idea to take its temperature so you can provide that information to the vet.

Any other observations that you can provide, such as differences in appearance or personality, can also help with the diagnosis.

## Keep your horse up to date on vaccines

The American Association of Equine Practitioners (AAEP) recommends that all horses be vaccinated against rabies, tetanus, West Nile virus, and Eastern/Western Equine Encephalomyelitis.

Some additional vaccinations, such as strangles, herpesvirus, and influenza, may also be recommended depending on your horse's individual risk factors.

Location, lifestyle, and travel plans, among many other factors, are considered when determining the most appropriate vaccinations for a horse.

It is important to work with your veterinarian to develop a vaccination program that is appropriate for your horse.

Remember, some vaccinations require serial doses given over a prolonged time period, or boosters given at a later date. Be sure that whatever vaccination your horse receives, it receives the full vaccination series.

## Be mindful of fomites

A fomite is an inanimate object that can transmit pathogens from host to host. While it is easy to see how objects like buckets, halters, wheelbarrows, and tack might be common fomites around a farm, there are many other fomites that are less obvious.

Hoses, leadlines, crossties, other animals, clothing, and people can all be fomites as well.

Even grass, communal water troughs, and fences can transmit pathogens! Take steps to reduce the risk of fomite-facilitated disease transmission.

For example, if you take your horse off property, don't share equipment with other horses; bring disinfecting wipes and spray to disinfect any potential fomites; if you work with horses from different farms, wear different clothes to each farm and disinfect your hands and shoes before entering each property.

**Malinowski continued her tour around the farm with students showing them how the pastures have been set up with gates that allow quick access in case of emergency, but also ensure that horses can be separated if needed. Providing separate pastures not only allows for rotational grazing, but if needed would allow a for a quarantine area to be set up.**

# Step Four: No One Is Perfect, Do Your Best

If all these strategies seem overwhelming, do not fear! Dr. Seraphin points out that it's important to keep in mind that no farm is going to have a completely "perfect" biosecurity plan; that isn't realistic.

For example, the Rutgers farm is an educational facility that is open to the public and hosts many large events such as Ag Field Day and the Junior Breeders Symposium.

While this degree of public interaction may not be "ideal" in terms of biosecurity, it is a risk that the Rutgers farm, by its nature as an educational facility, must take on.

What's important is to construct a biosecurity plan based on the type of operation you are running, and the amount of risk you are willing to take on. Ultimately, the best biosecurity plan is the one that best suits your farm—one that is both realistic and effective.

**For a biosecurity risk assessment calculator, visit the University of Guelph's website at: https://equineguelph.ca/Tools/biosecurity_calculator.php**

NJAEP
New Jersey Association of Equine Practitioners

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