

## Acyline to Suppress Stallion Testosterone Levels

A reversible testosterone suppression approach could offer a way to prevent carrier stallions from spreading equine arteritis virus.



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For some owners, lowering a breeding stallion's testosterone concentrations in the off-season is, among other uses, an attractive solution for undesirable behaviors. They can do this by administering a substance that suppresses the horse's hypothalamic-pituitary-gonadal (HPG) axis, which regulates testosterone.

Gabriel M. Davolli, DVM, MS, a theriogenology resident at Louisiana State University's School of Veterinary Medicine, studied one gonadotropin-releasing hormone antagonist's effects on suppressing the HPG axis and shared his results at the 2015 American Association of Equine Practitioners Convention, held Dec. 5-9 in Las Vegas. He conducted his research while completing his master's degree at the University of Kentucky's (UK) Gluck Equine Research Center, in Lexington.

Gonadotropin-releasing hormones (GnRH) essentially tell the stallion's reproductive system to produce testosterone. The appropriate antagonist would block this function.

Davolli described several reasons for suppressing testosterone:

- Stallions infected with the respiratory and reproductive disease-causing equine arteritis virus (EAV) can become carriers, constantly shedding the virus in their semen. Because the infection is testosterone-dependent, suppressing their testosterone might help prevent disease spread, he said.
- Lower testosterone levels could help curb sexual and aggressive behavior during training and competition.
- It provides an alternative to castration and its potential complications. Historically, some veterinarians have used the progestin altrenogest (used to manipulate mares' estrous cycles)

off-label for behavior modification in stallions. Others have "vaccinated" against GnRH, as is done in some mares to stop them from cycling. Both of these methods have variable effects on behavior, however, and not all stallions regain reproductive function, said Davolli.

So he and his colleagues set out to evaluate whether the GnRH antagonist acyline could effectively suppress the HPG axis without having detrimental effects on the stallion's future fertility. Doctors prescribe acyline to treat prostate cancer in men, and it has been shown to suppress testosterone concentrations in dogs. There is currently no FDA-approved veterinary acyline product, so the researchers used a compounded version.

Davolli used four treatment stallions and four controls, paired based on sperm count and testicle size. He administered intramuscular acyline to the treatment group for eight weeks, followed by nine weeks of "recovery." The team evaluated endocrine levels, semen characteristics, and testicular measurements during and up to 72 days after treatment. They also assessed the stallions' sexual behavior.

Based on their results, "treatment induced a decline in testosterone to gelding levels," said Davolli. "Testosterone returned to control values within nine days after the last treatment administration."

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## Acyline and Testosterone

Treated stallions' sperm count, motility, and volume decreased but quickly regained normal levels by 72 days post-treatment, he said. The only behavioral difference was that treatment stallions took longer to ejaculate than controls.

Davolli concluded that acyline can effectively and safely suppress the HPG

axis, and its effects are all reversible. Perhaps most importantly, testosterone concentrations as low as that of geldings might be sufficient to clear EAV virus in carrier stallions, he added.

Acyline did not, however, have a significant effect on stallion behavior, and this treatment is currently cost-prohibitive for owners. **UK**

>Alexandra Beckstett is the managing editor of *The Horse: Your Guide To Equine Health Care*.

## UK Study Examines Effects of Climate Change on Tall Fescue, Endophytes

The way tall fescue and its fungal endophytes react to future climate change will depend on the genetics of each organism, according to UK College of Agriculture, Food and Environment researchers.

Former UK graduate student Marie Bourguignon, MS; UK agroecologist Rebecca McCulley, MS, PhD; and Randy Dinkins, MS, PhD, a scientist with the USDA's Forage-Animal Production Research Unit, looked at the potential effects of warmer and wetter conditions on four different genotypes of KY 31 tall fescue, one of the most common grasses used in pastures in Kentucky and the Southeast. In their U.S. Department of Energy-funded study they looked at climate change effects on the common endophyte, a fungus found in most tall fescue that helps the plant grow better and tolerate environmental stress. The fungus is also an insect deterrent, but it can be toxic to grazing livestock, including horses. About 75% of all tall fescue in the United States is endophyte-infected.

"We really wanted to assess the response of the plant so we're able to predict what's going to happen in the future and to be able to give advice to farmers who use tall fescue in their pastures," said Bourguignon, now a doctoral student at Iowa State University.

Climate scientists predict that in 50 to 100 years, Kentucky will be around 3° Celsius warmer and could receive more rainfall. UK researchers simulated those effects using heat lamps to add 3° Celsius on top of the outside temperature and applied 30% more rainfall over the growing season using a water hose and precipitation collected on-site twice monthly.

Of the four climate treatment plots, one plot received no additional heat or precipitation. One plot received only the warmer temperatures. One received only the increased precipitation, and the other received both the increase in temperature and rainfall. UK scientists managed the plots as a typical Central Kentucky hayfield, harvesting the grass three times during the growing season.

Two of the tall fescues in the study had the common toxic strain of the endophyte. The other two had novel endophytes, which provide a growth benefit and improved stress tolerance to the plant without being toxic to mammals. Like the tall fescue, all



COURTESY UNIVERSITY OF KENTUCKY

Endophyte-infected tall fescue can have damaging effects on broodmares.

## Masthead

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## Climate Change

of the endophytes used in the study had different genetic makeups.

“We found that each plant and endophyte combination had unique responses to the treatments,” Bourguignon said. “Some fescue-endophyte combinations responded very well to climate changes, but others, not so much. Some plants infected with the common endophyte strains will be even more toxic for livestock when temperatures are elevated. That is not what we want.”

The common endophyte produces alkaloids, which have a range of physiological effects on grazing animals, including impairing vascular function. Livestock consuming alkaloid-laden tall fescue can develop fescue toxicosis. This most commonly affects cattle, and

clinical signs of disease can include elevated body temperature and decreased weight gain. It can also negatively affect pregnant mares, as it can impact the amount of blood the fetus gets, as well as causing prolonged gestation, difficulty foaling, agalactia (no milk production), and mare and foal deaths.

Forage producers commonly manage the effects of the toxic endophyte by planting other grasses or legumes to dilute the endophyte’s effects. Some are also replanting their fields using tall fescue varieties containing the novel endophyte strains described.

“Our research shows that while tall fescue persists under warmer and wetter conditions, it is less dominant than in pastures today,” McCulley said. “Maybe that will help dilute the effects of those toxic compounds, but if you have a pasture dominated by common endophyte-

infected tall fescue, those conditions and the elevated alkaloids they produce will create more intense, negative effects on animals that have to graze that material.”

The researchers also found some of the tall fescue infected with the novel nontoxic endophytes did not recover as quickly from the summer heat as compared to the tall fescue that was infected with the common endophyte, which could result in less productivity. The researchers said it is important that new fescue cultivar and endophyte combinations be screened for environmental tolerance before being widely adopted by farmers to help ensure continued pasture productivity, resilience and profitability in the future. **UK**

>Katie Pratt is an agricultural communications specialist within UK’s College of Agriculture, Food, and Environment.

## Equine Genetics Researcher Lear Dies at 64

Teri L. Lear, PhD, an equine genetics researcher and associate professor of veterinary science at UK’s Gluck Equine Research Center, died May 14 in Lexington, Kentucky, after a long battle with cancer. She was 64.

Lear developed a love for horses very early in life, especially Saddlebreds, leading to a lifelong study of horses as an owner, a student and later a research scientist, an obituary from Milward Funeral Directors, in Lexington, stated.

She earned her BS degree in biology at Indiana University Southeast, a MS in cytogenetics at the University of Louisville, and a PhD degree in genetics at the University of Kentucky. Lear became one of the foremost experts in cytogenetics of the horse, published numerous studies on equine genetics, trained MS and PhD students, and was one of the leaders in the Horse Genome Project—a project that resulted in the first map of a horse’s genetic sequence. Lear also lectured to practitioners and horse owners alike at educational events on a range of genetic topics.

Lear’s colleague at the Gluck Center, Ernie Bailey, PhD, said she lived a “full life with her home, garden, cats, research, students, and her friends. ... We will miss her.”

Lear is survived by her sister, Sharon L. Cooper; her niece, Leigh A. Cooper; and grandnephew, Barrett Lear Brown. **UK**

>Erica Larson is the news editor for *The Horse: Your Guide To Equine Health Care*.



Teri L. Lear, PhD, pictured with her horse Bisquette, died May 14.

PATRICK PFISTER

## Undergraduate Research Project Changes Tall Fescue Sample Handling Procedures at UK VDL

In 2015 more than 300 tall fescue samples were submitted to the UK Veterinary Diagnostic Laboratory (VDL) for ergovaline—an ergot alkaloid that causes a wide range of issues in pregnant mares—analysis. Results from these samples, which are preserved in a freezer and then tested, were used by farm managers to make pasture management decisions and by researchers to better understand and predict tall fescue toxicity in horses and other livestock.

**Milled samples contained significantly more ergovaline than the control samples or whole material after storage.**

AnnMarie Kadnar, a senior in the Equine Science and Management undergraduate degree program, compared samples of tall fescue frozen as whole plant material or milled material. She found that milled samples often resulted in higher concentrations of ergovaline compared to the control and

## Tall Fescue Handling

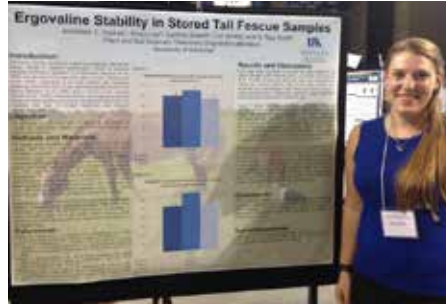
whole samples. In the same study, Kadnar found no influence of storage time, for up to seven days.

"The results surprised me because I would have thought time of storage would have an influence on ergovaline levels, in addition to the storage conditions," Kadnar said.

The causes of this observed increase in ergovaline levels are not fully understood, but many, including Kadnar, believe that some biological process, including ergovaline production, could be accelerated by the milling process and can continue in the freezer. This position is in agreement with other work from around the world and suggests that ergovaline might not be stable in stored plant tissues.

This research will have an immediate impact on how ergovaline levels are tested at the UK VDL this year.

"Our priority is to provide high-quality



Undergraduate Equine Science and Management student AnnMarie Kadnar presented her research in ergovaline stability at the University of Kentucky Showcase of Undergraduate Scholars on April 27.

analytical results that are directly applicable to the needs of our clients," said Lori Smith, PhD, an analytical chemist at the UK VDL. "As a result of AnnMarie's ergovaline stability study, we no longer mill fresh forage samples until the day of actual testing. Our hope is this will yield results that are more representative of the actual levels to which livestock are exposed when grazing."

Ergovaline is produced by the endophyte *Epichloa coenophyllum* (Morgan-Jones & W. Gams) that infects most naturally occurring tall fescue (*Schedonorus arundinaceus* [Schreb.]) plants in the Southeastern United States. In broodmares, ergovaline can cause prolonged gestation, resulting in large foals and dystocia (difficult birth) as well as low milk production after foaling. Tall fescue toxicosis is also blamed for significantly decreased gains in beef cattle, among other complications.

Farm managers and horse owners regularly submit tall fescue samples from pasture, hay, or bedding to the UK VDL to assess the potential risk to their animals. According to the UK Horse Pasture Evaluation Program, pastures that are found to contain more than 200 ppb (parts per billion) ergovaline in total available forage are considered to pose high risk to late-term pregnant mares. Pregnant mares should be removed from these pastures until management steps can be taken to reduce the risk. These can include mowing to remove seed heads where ergovaline is highly-concentrated, adding other forages such as Kentucky bluegrass and orchardgrass to the pasture, or the use of herbicides to remove tall fescue from the pasture.

Research is ongoing worldwide to better understand this interaction and the significant impacts of tall fescue toxicosis on horses and cattle.

Kadnar presented her research on April 27. "The (UK) Showcase of Undergraduate Scholars gave me an opportunity to present my findings to individuals who may not know that tall fescue is a problem here in Central Kentucky," said Kadnar. "I enjoy educating others about topics that I am passionate about.

"This research excites me because it was the project that got me interested in plant and soil science research and influenced me to pursue a master's degree," she added. "Getting significant results was icing on the cake."

Kadnar graduated with honors from UK on May 8 and will pursue a Master of Science from the UK Department of Plant and Soil Sciences beginning in fall 2016. **UK**

>Krista Lea, MS, is research analyst and coordinator of the UK Horse Pasture Evaluation Program within the UK Department of Plant and Soil Sciences.

## GRAD STUDENT SPOTLIGHT

**NAME: SARAH ELZINGA**

**From: Grand Rapids, Michigan**

**Degrees and institute where received:**  
**B.S. in equine science from St. Mary of the Woods College, Indiana;**  
**M.S. in animal science with a focus on equine nutrition from Michigan State University**



Sarah Elzinga came to the UK Gluck Equine Research Center to pursue her doctoral degree under Amanda Adams, PhD, an assistant research professor at the Gluck Center. Elzinga's research program combines the study of immunology, inflammation, and endocrinology with her existing nutrition background from her master's degree.

In her research project Elzinga aims to gain further understanding of the metabolic and inflammatory factors associated with horses with metabolic dysfunction.

"The research allows for a better understanding of the mechanisms that may predispose the animal to the development of laminitis," Elzinga said.

In her time as a doctoral student, Elzinga has also worked on projects determining inflammatory and immune responses to several factors, as well as research to better characterize horses with equine metabolic syndrome.

"My most valuable takeaway will be the gained knowledge in experimental design, procedure, the opportunity to work with industry partners, and overall experience," Elzinga said.

After obtaining her PhD, Elzinga plans to pursue a career in academia. **UK**

>Hannah Forte is a former communication intern with the UK Ag Equine Programs and Gluck Equine Research Center. She earned her bachelor's degree in community and leadership development at UK in May 2016.

## Author Donates Portion of Children's Book Proceeds to UK's Gluck Center

In the summer of 2013, longtime horse owner and then graduate student Kristen Halverson called the UK Gluck Equine Research Center seeking advice and questions she had regarding equine protozoal myeloencephalitis (EPM), a neurologic disease caused by the parasite *Sarcocystis neurona*, which infected her off-track Thoroughbred Nino Tempo.

"A very kind doctor from your organization helped me answer a myriad of questions regarding EPM and the necessary steps to enhance treatment," Halverson said of her conversation with Dan Howe, PhD, professor at the Gluck Center.

Halverson later wrote a children's book, *The Tale of Josephine Rose: A Horse's Magical Neigh*, which was published in February by Dog Ear Publishing. She is donating a portion of all book proceeds to Howe's research program.

"Kristen's sense of benevolence is why the Gluck Center exists and what allows our faculty,

staff, and students to succeed in helping horses and horse owners," Howe said.

Halverson said the generosity Howe showed stuck with her and she wanted to find a way to help raise awareness for such an important disease that needs more research funding.

"I am still most grateful for his willingness to take time out of his busy day to help a student from a different educational institution," Halverson said.

She describes *The Tale of Josephine Rose: A Horse's Magical Neigh* as "a heartfelt story based on my own horses that is about acceptance, kindness, and courage."

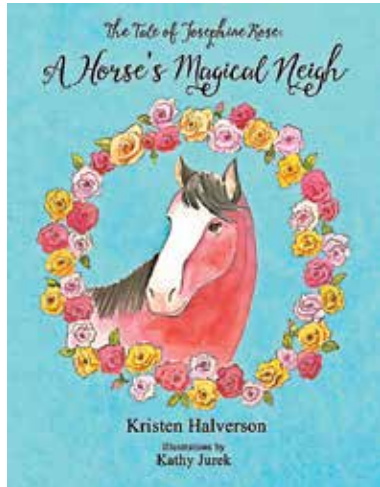
When Halverson and her husband, who live in northeast Iowa, purchased a new Clydesdale, named Josephine Rose, the mare was subjected to some bullying from other horses. Halverson took those personal experiences, along with her passion for equine welfare, to help raise more awareness about EPM. She said the underlying message is also about respect and appreciating differences.

"In some tones, it has helped people feel more accepted after reading the book," Halverson said.

*The Tale of Josephine Rose: A Horse's Magical Neigh* is available on Amazon at <http://amzn.to/1WPaaT6>.

Halverson also has a Facebook page at <https://www.facebook.com/ahorsesmagicalneigh/> for anyone interested in following upcoming book events. **UK**

>Jenny Evans, MFA, is the interim executive director of the Gluck Equine Research Foundation, and marketing and promotion specialist senior for the Gluck Equine Research Center.



## THE GRASS GUIDE

### WHITE CLOVER (*Trifolium repens*)

**Life cycle:** Cool-season perennial

**Native to:** Eastern Mediterranean region

**Uses:** Pasture

**Identification:** Trifoliate leaves with a white crescent mark and white flowers

White clover is the most widely found pasture legume in the United States. It grows in most states, but it predominates from Missouri east due to its lack of drought tolerance. Mostly seen in pastures and fields, white clover grows better on well-drained loam or clay soils than sandy soils. White clover is an excellent choice to add to

pastures to increase overall forage quality and provide nitrogen to grasses. White clover is very competitive and can overrun other species because it spreads easily by above ground runners (called stolons). A shallow root system means that white clover needs cool, moist conditions for optimum growth, but is still winter hardy in all but the most northern states. **UK**

>Krista Lea, MS, coordinator of UK's Horse Pasture Evaluation Program; AnnMarie Kadnar, master's student; and Ray Smith, PhD, professor and forage extension specialist, all within UK's Department of Plant and Soil Sciences, provided this information.



(Top) The iconic flower of white clover. (Middle) Roots of white clover are shallow, unable to reach moisture deep in the soil. (Bottom) When conditions are right, white clover can be very competitive and take over large portions of a pasture.

### WHITE CLOVER DISTRIBUTION



## UK Ag Equine Programs Recognized for Excellence at Local PRSA Awards Ceremony

The UK Ag Equine Programs recently took home three top honors for excellence in communications from the Lexington-based Thoroughbred Chapter of the Public Relations

Society of America at its annual awards luncheon April 19.

The program's two newsletters, the *Bluegrass Equine Digest* and the *Wildcat Canter*, as well as a campaign celebrating the 10th anniversary of the program, all garnered top awards.

The *Bluegrass Equine Digest* and the *Wildcat Canter* both earned "win" distinctions in the online category



through a points system that awards a win, place, or show based on the quality of the work submitted. Both ended up with enough points to earn the win distinction.

In the campaigns category, the program was recognized in the special events category for its 2015 campaign, "Celebrating 10 Transformative Years of Equine Education & Impact." UK

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## Student Entrepreneur Team Race Assured Finishes Fourth in Finals Competition

The UK student entrepreneur team Race Assured placed fourth at the Idea State U finals competition April 22-23 at the Griffin Gate Marriott in Lexington.

The team of Julia Fabiani, an undergraduate in equine science and physiology; Stefanie Pagano, a graduate student in biomedical engineering; and Ben Martin, a graduate student in finance and agricultural economics, received \$7,500 for their win in the business plan category.

The Race Assured team presented a business plan for a blood test that could potentially predict injuries in horses well before serious problems occur. The team also won the Georgia Bowl intercollegiate entrepreneurship competition hosted by Georgia Tech.

The competition included presenting their business plan or model to a panel of judges, a written proposal, marketing video, display, and elevator pitch.



## Race Assured Fourth

The Kentucky Office of Entrepreneurship, part of the Kentucky Cabinet for Economic Development, oversees Idea State U.

UK's student entrepreneur teams are mentored and coached through the UK Venture Challenge annual competition and the Venture Studio Bootcamp. Venture Challenge is part of iNET in the College of Communication and Information. Venture Studio Bootcamp is part of the Von Allmen Center for Entrepreneurship and Lexington Office of the Kentucky Innovation Network, in the Gatton College of Business and Economics. [UK](#)

## Upcoming Events

### June 30, 4 p.m.

UK Department of Veterinary Science  
Equine Diagnostic and Research Seminar Series

David Hurley, PhD, University of Georgia, will speak about "Tissue level events in the development and control of immune responses to infection, vaccine and tumors" at the UK Veterinary Diagnostic Laboratory.

### July 28, 4 p.m.

UK Department of Veterinary Science  
Equine Diagnostic and Research Seminar Series

David Poole, PhD, DSc, Kansas State University, will speak about "Pushing and pulling across the blood gas barrier mechanisms of EIPH" at the UK Veterinary Diagnostic Laboratory.

## Genetic Testing at Gluck: Did You Know ...

... Black horses can carry the normally dominant cream dilution gene, which is responsible for palominos and buckskins, yet show no outward sign of it? This can result in a "surprise" palomino foal, even when both parents are black. A black horse carrying the cream dilution gene is known as a smoky black. A DNA test can determine if a black horse is indeed also carrying the cream dilution gene.

For additional information on the tests offered, including pricing and how to submit samples, visit [www.ca.uky.edu/gluck/AGTRL](http://www.ca.uky.edu/gluck/AGTRL). [UK](#)



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## Stay Socially Connected to UK Ag Equine Programs

The UK College of Agriculture, Food and Environment has several equine-related social media pages featuring the latest news and events information.

Follow us on Twitter:

**UK Ag Equine Programs:** [@UKAgEquine](#)

**UK Maxwell H. Gluck Equine Research Center:** [@UKGluckCenter](#)



Prefer Facebook? Like these pages we administer:

**University of Kentucky Ag Equine Programs:** An overarching framework for all things equine at the University of Kentucky, including the undergraduate degree program, equine-related student organizations, equine research, and outreach activities.

**University of Kentucky Equine Alumni:** A community established for the alumni of the University of Kentucky's equine programs, including ESMA, graduate students and clubs and team members.

**University of Kentucky Maxwell H. Gluck Equine Research Center:** The mission of the Gluck Center is scientific discovery, education, and dissemination of knowledge for the benefit of the health and well-being of horses.

**University of Kentucky Horse Pasture Evaluation Program:** A service program offered to Kentucky horse farms with the goal of improving overall pasture management.

**Saddle Up SAFELY:** A rider safety awareness program sponsored by UK Health-Care, UK College of Agriculture, Food and Environment, and many community organizations. It aims to make a great sport safer through education about safe riding and horse-handling practices. [UK](#)

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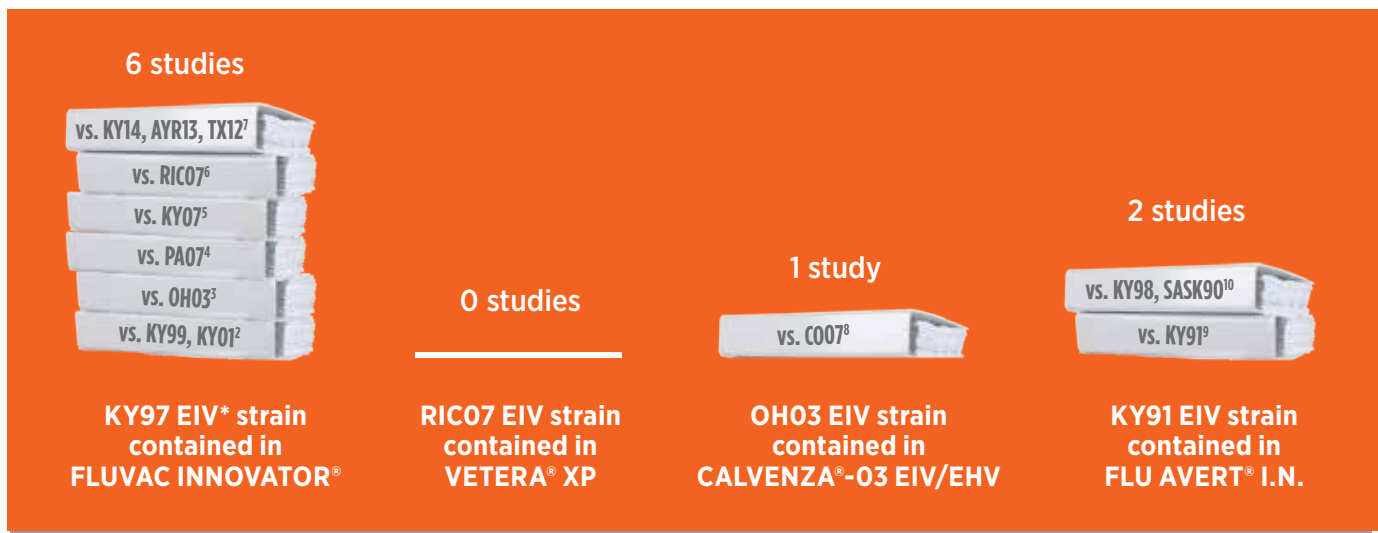
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\* Equine Influenza Virus

\*\* World Organization for Animal Health

<sup>1</sup> West Nile-Innovator and Fluvac Innovator MDI Sales Data as of 12/31/14. Zoetis. Dec. 2014.

<sup>2-7</sup> Data on file, Study Report No. 671-02-001R, 671-08-004.R, 766-09-002.R, 100REQBIO-01, 140REQBIO-1 and 15EQRGBIO-02, Zoetis Inc.

<sup>8</sup> Calvenza vs. CO07 ACVIM 2011 abstract reference.

<sup>9</sup> Townsend HGG, Penner SJ, Watts TC, Cook A, Bogdan J, Haines DM, Griffin S, Chambers T, Holland RE, Whitaker-Dowling P, Youngner JS, and Sebring RW: Efficacy of cold-adapted, intranasal, equine influenza vaccine: challenge trials.

<sup>10</sup> Chambers TM, Holland RE, Tudor LR, Townsend HGG, Cook A, Bogdan J, Lunn DP, Hussey S, Whitaker-Dowling P, Youngner JS, Sebring RW, Penner SJ and Stiegler GL: A new modified-live equine influenza vaccine: phenotypic stability, restricted spread and efficacy against heterologous virus challenge.

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