Which Biomarkers Best Predict Late-Term Pregnancy Loss?

Late-term pregnancy loss in mares continues to be a significant problem in reproduction practice. In recent years, researchers have identified several biomarkers that can indicate when trouble’s brewing (TheHorse.com/38108), but hadn’t yet done a large-scale field study to evaluate them.

So a team from the University of Kentucky (UK), in Lexington, examined changes that occurred in four established biomarkers in mares with both normal and abnormal pregnancy outcomes. Barry Ball, DVM, Dipl. ACT, presented their results at the 2016 American Association of Equine Practitioners’ Convention, held Dec. 3-7 in Orlando, Florida.

The biomarkers of interest in this study were:

- The estrogen estradiol-17B. The fetus and placenta produce estradiol during pregnancy. Previous study results have shown that estradiol levels decrease when experimental placentitis is induced at nine months of gestation.

- Alpha fetoprotein (AFP). This protein is present in the fetal fluids and can cross the placenta into the maternal circulation. Concentrations increase in mares with induced placentitis.

- Serum amyloid A (SAA). This biomarker increases in response to any inflammation in the body and has been shown to increase in pregnant mares a few days post-placentitis induction.

In their study, Ball and his team recruited 700 mares from 15 Thoroughbred farms in Central Kentucky. Starting in December, they collected blood samples weekly until the mares either foaled or aborted. From this group, 15 mares aborted (8) or had lesions on their placentas after foaling (7). For the purpose of the study, the team matched each of these mares with two matched control mares.

The affected mares’ mean age was 11, and their diagnoses included umbilical cord lesions (2), equine herpesvirus-1 (1), abortion of unknown cause (3), nocardioform placentitis (2), bacterial placentitis (5), and premature placental separation (2).

Looking at these mares’ weekly blood sample results, Ball said estradiol levels decreased as parturition (foaling) approached. At the week of pregnancy loss or foaling, decreases in estradiol concentrations and elevations in AFP concentrations could help predict abnormal pregnancy outcomes during late gestation.

Anne M. eberhardt/the horse

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**Biomarkers**

all case mares had significantly lower levels than did controls. This decline was particularly steep in mares with placenitis.

Progesterone levels increased as expected in both groups, rising more rapidly in mares with placenitis. There were no significant differences between case and control mares, however, at the week of pregnancy loss or foaling.

Alpha fetoprotein concentrations were significantly higher in case mares than controls and increased the closer the mare got to foaling.

And, lastly, Ball said SAA levels were not significantly different between case and control mares in the two weeks before foaling or abortion.

So, from Day 290-300, estradiol levels decrease and progesterone levels increase in affected mares. At foaling or abortion, estradiol decreases, AFP increases, and progesterone and SAA are not predictive. In mares with placenitis, progesterone increases in the four weeks prior to foaling or abortion, and estradiol decreases in the two weeks prior.

*This study suggests that decreases in estradiol concentrations relative to control mares and elevations in AFP concentrations, within seven days of parturition or abortion, may be useful in predicting abnormal pregnancy outcomes during late gestation based upon a single serum sample,* the authors wrote.

Said Ball, *“If you’re going to use this information in a clinical setting, first establish normal reference levels for estradiol and progesterone based on the assay used and gestational age.”* UK

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

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**UK, University of Copenhagen Team Up for Dual PhD Program**

The University of Kentucky and the University of Copenhagen, in Denmark, have a long history of collaborating on research.

A few years ago, the two universities extended this history by partnering to offer a dual doctoral degree program. In the summer of 2015, Jasmin Bagge, DVM, from Denmark, became the first student enrolled in the program.

James MacLeod, VMD, PhD, John S. and Elizabeth A. Knight chair and professor of veterinary science at the UK Gluck Equine Research Center, serves as Bagge’s co-mentor at UK. Across the pond, Lise Berg, DVM, PhD, associate professor in applied clinical biomedical sciences, and Denis Verwilghen, DVM, MSc, PhD, DES, Dipl. ECVS, associate professor, are Bagge’s co-mentors at the University of Copenhagen.

Bagge came to UK with a strong interest in equine orthopedic injuries. A dressage rider, she is particularly excited about the future of stem cells and regenerative medicine to facilitate tissue repair following injury. The University of Copenhagen is paying for Bagge’s tuition, stipend, and some research funding—a bonus of entering the dual degree program.

Bagge first heard about the program before completing her veterinary medicine degree and was excited about such a unique opportunity, especially after reading peer-reviewed articles published by MacLeod and Berg.

“I just think Gluck is an absolutely unique equine research facility,” she said. “I haven’t heard about anywhere else where you have so much equine-centered
Dual PhD Program

The equine industry had another steady year and accounted for 17% of Kentucky’s sales receipts in 2016.

“Cross-Atlantic projects like this require financial and administrative support to succeed, and we are working hard to secure the future for the program,” Berg said. UK.

2016 Kentucky Net Farm Income Likely to Hit Lowest Level Since 2010

Kentucky’s net farm income is expected to dip to less than $1.5 billion in 2016, down from $1.7 billion in 2015 and potentially its lowest level since 2010. A significant decline in cash receipts over the past couple of years, plus the end of tobacco buyout payments in 2014, have been the major reasons behind the rapid fall in Kentucky’s net farm income since peaking at nearly $3 billion in 2013.

The state’s agricultural cash receipts in 2016 are projected to fall to $5.4 billion, off 7% from $5.8 billion in 2015 and off 17% from the record high of $6.5 billion in 2014. On the national front, prices and incomes fell for the third straight year.

“2016 has been another challenging year for Kentucky agriculture with considerable price and weather volatility,” said Will Snell, MS, PhD, Extension professor in the UK Department of Agricultural Economics. “Price and profit challenges will remain a major concern heading into 2017 in the midst of ample commodity supplies, a strengthening U.S. dollar, and sluggish global economic growth. However, assuming there are no major supply or demand shocks, net farm income for Kentucky farmers may show signs of stabilizing in 2017 as the global markets work off excess supplies and global economies begin to show some modest growth.”

Snell and other UK College of Agriculture, Food and Environment faculty, including agricultural economists Kenny Burdine, MS, PhD, Todd Davis, MS, PhD, and Tim Woods, MS, PhD; Bobby Ammerman from the Department of Forestry; and Kentucky Farm Business Management Program coordinator Jerry Pierce, MS, shared their agricultural economic outlook for 2017 and an overview of 2016 on Dec. 1 during the Kentucky Farm Bureau’s 97th annual meeting in Louisville.

Poultry receipts should be back on track in 2016 after rebounding from the effects of avian influenza in 2015, with growth
**Net Farm Income**

continuing in 2017. Poultry remains Kentucky’s No. 1 agricultural enterprise with 23% of projected sales, followed by equine, which had another steady year and accounted for 17% of sales receipts. Soybeans (15%), corn (13%), and cattle (12%) were next on the list.

Much of the decline in Kentucky agricultural sales for 2016 can be attributed to rapidly falling cattle receipts, which fell by more than 30% in response to mounting beef, poultry, and pork supplies.

“Efficient operations are likely covering cash costs and breeding stock depreciation, but there is little to no return on capital, land, and management costs,” Burdine said.

He predicts producers will see some improvement in price during spring 2017, but expects a significant drop from spring to fall, given an expected increase in beef cow numbers, as well as continued growth in the production of competing meats.

Horse receipts remain flat. September yearling sales were down about 3%, and early November breeding stock sales were solid before slumping at the end when mid- to lower-quality horses were placed on the market.

A record U.S. soybean yield and production is projected to increase total supply to a record of more than 4.58 billion bushels. Exports finished 265 million bushels above October 2015 estimates because of South American production problems, which also increased corn exports. The U.S. corn supply will set a record in 2016 of more than 17 billion bushels, with exports finishing above April 2016 estimates. In wheat, a record U.S. yield offset a 3.4-million-acre reduction in harvested area, with the supply projected to increase 448 million bushels from 2015. Wheat exports are projected to top the preceding year, but are still 200 million bushels below 2013, Davis said.

Tobacco receipts slumped to their lowest post-buyout level due primarily to unfavorable weather and curing conditions. A combination of much lower yields and a very poor-quality crop will likely cause the Kentucky value of tobacco production to fall below $300 million in 2016.

The excessive rain in summer 2016 resulted in modest decreases in produce sales to about $38 million, down from $40 million in 2015, Woods said. Stronger greenhouse sales should offset slower nursery sales and reach about $96 million, the same as last year.

“The big winner in the current depressed ag economy are consumers, with lower meat prices primarily leading the way and fruits and veggies relatively stable in 2016,” Snell said. “Food price inflation is expected to remain relatively tame for 2017, as well.”

Overall, the forestry sector declined 4.8% from 2015. Lackluster markets for most of the hardwood lumber species, decreased demand for products such as railway ties, and the Verso pulp and paper mill closing in Wickliffe dragged down the sector. Bucking the trend, however, was the increased demand for white oak stave logs used for bourbon whiskey barrels. The seller’s market in that area should continue into 2017.

“Without any major supply or demand shocks, ag commodity prices in 2017 may not be as volatile and...
production expenses may remain relatively stable, but government farm payments could be lower in response to the structure of the current farm bill,” Snell said. 

Find the outlook publication, including information on individual farm sectors, at uky.edu/ag/agecon/pubs/extoutlook161758.pdf. UK

>Carol Lea Spence, agriculture communications specialist in UK’s College of Agriculture, Food and Environment, supplied this information.

UK to Host Tall Fescue Pasture Renovation Workshop

Anyone who has spent a considerable amount of time around livestock or forages knows tall fescue is a double-edged sword: The grass is hearty and generally grows well, but it can be infected with a fungus that can be dangerous to grazing livestock, including horses. So, UK forage specialists are teaming up with the Alliance for Grassland Renewal to host a workshop aimed at teaching producers how to renovate their old tall fescue pastures with a novel endophyte variety.

The Tall Fescue Renovation Workshop will take place March 9, 2017, at UK’s Veterinary Diagnostic Laboratory and UK’s Spindletop Research Farm.

Tall fescue grows well, but some varieties can contain a toxic fungus.

UK Celebrates 25 Years of Lloyd’s of London Partnership

The long-term partnership between Lloyd’s of London and the UK College of Agriculture, Food and Environment celebrated 25 years of continued financial support when representatives from Lloyd’s recently presented UK with a $50,000 check.

“Lloyd’s has long been a leading bloodstock insurer in Kentucky, and a quarter century of financial support demonstrates the underwriters’ commitment to good equine health and cutting-edge research,” said Patrick Talley, U.S. central region manager for Lloyd’s America.

The partnership supports the Lloyd’s Equine Disease Quarterly, a publication dedicated to equine health and welfare, produced by the UK Department of Veterinary Science Maxwell H. Gluck Equine Research Center.

“The College of Agriculture, Food and Environment is grateful to Lloyd’s of London for this long-standing and unique support of the veterinary science department in general since 1985 and of the Equine Disease Quarterly for 25 years,” said Dean Nancy Cox, MS, PhD. “Because of Lloyd’s support, this publication has achieved iconic status in the international equine industry, and we are so grateful.”

The award-winning publication provides timely and authoritative reports on some of the most important issues facing the equine industry. The Quarterly reaches more than 18,000 readers in 102 countries. Available in paper and online, its articles are regularly reprinted in scientific and lay equine publications worldwide.

Lloyd’s Equine Disease Quarterly is available to subscribers at no charge. It is co-edited by Cynthia Gaskill, DVM, PhD; Alan Lownachan, DVM, PhD, Dipl. ACVP; and Peter Timoney, FRCVS, PhD, from the Department of Veterinary Science.

The most recent issue is available online at www2.ca.uky.edu/gluck/q_oct16.asp.

For more information about the Department of Veterinary Science and the Maxwell H. Gluck Equine Research Center, visit www.ca.uky.edu/gluck.

Lloyd’s of London is a 328-year-old insurance market whose members underwrite risk on a direct and reinsurance basis in more than 200 countries. As a global leader in specialty insurance, Lloyd’s remains committed to supporting equine research and providing the insurance coverage essential to the health and well-being of horses and the prosperity of equine industries worldwide. UK

>Jenny Evans is the marketing and promotion specialist senior at the UK Gluck Equine Research Center.
**Fescue Workshop**

Producers have widely used tall fescue in pastures for decades, because it survives well under many conditions including drought, cold, overgrazing, insects, and diseases. However, the most common variety, KY-31, also contains toxins that can severely affect cattle and horses.

“Now, with a growing number of novel or friendly endophyte tall fescue varieties on the market, there is a solution to fescue toxicity,” said Ray Smith, PhD, forage extension specialist in the UK College of Agriculture, Food and Environment. “UK’s own novel endophyte variety, Lacefield MaxQ II, will be available in the fall of 2017.”

During the workshop, participants will hear from specialists from UK, the USDA Forage-Animal Production Research Unit, University of Missouri, USDA Natural Resources Conservation Service, and Missouri Forage and Grassland Council’s Grazing Lands Conservation Initiative, as well as producers and industry representatives. While this will be the first time the workshop is in Kentucky, the Alliance for Grassland Renewal has hosted similar workshops in Missouri and surrounding states.

“This will be one of the most practical workshops available to Kentucky livestock producers in 2017,” Smith said. To register or for more information visit the UK Forage Extension website at [www.uky.edu/Ag/Forage](http://www.uky.edu/Ag/Forage).

Katie Pratt is an agriculture communications specialist for the UK College of Agriculture, Food and Environment.

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**UK Ag Equine Programs to Host 2017 Equine Showcase, Breeders’ Short Course**

University of Kentucky Ag Equine Programs will host the 6th Annual UK Equine Showcase and the 8th Annual Kentucky Breeders’ Short Course Jan. 27-28, 2017, both at the Fayette County Extension office, 1140 Red Mile Place, in Lexington.

The UK Equine Showcase will highlight the university’s equine programs and relevant industry findings with an emphasis on immunology. It will run from 1 p.m. to 5 p.m. Jan. 27.

The Kentucky Breeders’ Short Course is an in-depth program on horse management issues and will focus specifically on preventive measures designed to reduce the risks of introducing and transmitting infectious disease. It will run from 8 a.m. to 2:30 p.m. Jan. 28, with lunch provided.

“This year our focus will be on biosecurity, an issue which should be of great interest to the audience,” said David W. Horohov, PhD, chair of the UK Department of Veterinary Science and director of the Maxwell H. Gluck Equine Research Center within the College of Agriculture, Food and Environment. “The program will feature presentations on various aspects of biosecurity ranging from the factors and concerns at the farm, clinic, state, national, and international level.”

Topics and speakers for the UK Equine Showcase will include:

- **Equine vaccination: What, when, and why?**—Horohov;
- **Disease surveillance and monitoring utilizing geographic information system (GIS) and temporal spatial scan statistics in Kentucky**—Jacqueline Smith, PhD, epidemiology section head at the UK Veterinary Diagnostic Laboratory;
- **Rhodococcus equi: An update**—Fernanda Cesar, MS, DVM, Dipl. ACVIM, graduate student at the UK Gluck Center;
- **Barn Ventilation**—Morgan Hayes, PhD, PE, assistant extension professor in livestock systems in the UK Department of Biosystems and Agricultural Engineering;
Pastures Please!!
Pasture Management for the Horse Owner

The Cooperative Extension Service of Bourbon, Clark, Fayette, Jessamine, Mercer, Scott and Woodford counties invite you to attend an informative meeting on the management of horse pastures. This program presents some of the latest information geared specifically toward the horse owner/manager.

January 30, Fayette County Extension Office, 1140 Red Mile Place, Lexington

5:30 p.m. Registration with light refreshments sponsored by McCauley’s
6-8 p.m. Program
Krista Lea, Managing to Reduce Tall Fescue Toxicosis
Dr. Karen McDowell, Grazing Novel Tall Fescues with Confidence
Dr. Cynthia Gaskill, Top 10 Equine Poisons in Kentucky
Dr. JD Green, Weed Control in Pastures

Door prizes will be given out. An RSVP is encouraged but not required. Please contact your County Extension Agent to reserve a spot. 2017 Pastures Please!! is organized by the Equine Pasture and Forage Working Group at the University of Kentucky College of Agriculture, Food and Environment, and sponsored by the UK Cooperative Extension Service and UK Ag Equine Programs.
An overview of research programs: What’s the focus?—Mick Peterson, PhD, incoming UK Ag Equine Programs director and incoming professor within UK’s Department of Biosystems and Agricultural Engineering; and

New perspectives on foal nutrition; Laurie Lawrence, PhD, professor of equine nutrition in UK’s Department of Animal and Food Sciences.

Kentucky Breeders’ Short Course topics will include:

Biosecurity and infectious disease control: What about it?—Lucas Pantaleon, DVM, MS, Dipl. ACVIM, MBA, a veterinarian based in Versailles, Kentucky;

National biosecurity issues: The need for speed—Roberta Dwyer, DVM, MS, Dipl. ACVPM, extension professor of veterinary preventive medicine within UK’s Department of Animal and Food Sciences;

International movement of horses—Allen Page, PhD, DVM, a researcher with USDA Animal and Plant Health Inspection Service;

State veterinarians’ perspective on biosecurity—Robert Stout, DVM, and Rusty Ford, of the Office of the Kentucky State Veterinarian;

Biosecurity in the hospital setting—Bonnie Barr, VMD, Dipl. ACVIM, veterinarian at Rood & Riddle Equine Hospital, in Lexington, Kentucky; and

Biosecurity on the breeding farm: What is practical?—Nathan Slovis, DVM, Dipl. ACVIM, CHT, veterinarian at Hagyard Equine Medical Institute, in Lexington, Kentucky.

Both programs are open to veterinarians, owners, and managers of all horse breeds or anyone with an interest in learning more about equine reproduction and topics concerning horse management. Continuing education credit for veterinarians and veterinary technicians is pending approval by the Kentucky Board of Veterinary Examiners.

Sponsor participation is also being accepted for the event, and display opportunities are available to participating organizations. Please e-mail equine@uky.edu for details.

To register for the event, visit 2017ukshowcaseshortcourse.eventbrite.com. UK Equine Showcase rates are $50 per person or $40 each when two or more people from the same organization register at the same time. Early registration rates for the Kentucky Breeders’ Short Course are $75 per person or $65 each when two or more people register at the same time. Attendees can enroll in both the showcase and the short course for $100 per person or $90 each when two or more people from the same organization register. Registration will close Jan. 23, 2017.

College students are eligible for a reduced rate to the showcase and short course, but student space is limited and available on a first-requested, first-served basis. Students or UK faculty interested in attending either or both days should e-mail jenny.evans@uky.edu. For more details about the event and other information about UK Ag Equine Programs, visit www.ca.uky.edu/equine.
Although not well-known, *Leptospira interrogans* serovar Pomona can cause devastating problems. *L. pomona* can colonize in the kidneys, be shed in the urine and the horse can become septicemic, which can potentially lead to abortion, uveitis and acute renal failure. LEPTO EQ INNOVATOR® is the first *Leptospira* vaccine developed specifically for horses to help prevent leptospirosis caused by *L. pomona*. It also helps prevent infections of the blood, which could, but has not been demonstrated to, help reduce the potential risk of equine recurrent uveitis, abortion or acute renal failure caused by *L. pomona*. An efficacy trial demonstrated LEPTO EQ INNOVATOR safely helps prevent *L. pomona* infections and urinary shedding.\(^1\) A safety trial showed it was 99.8% reaction-free.\(^2,3\) To learn more, visit LEPTOEQINNOVATOR.com.

\(^*\)Currently, there are no vaccines available with USDA-licensed label claims against equine abortions, uveitis or acute renal failure due to *L. pomona*.