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EQUINE DISEASE QUARTERLY

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IN THIS ISSUE

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A PREVIEW OF THE OCTOBER 2025 EDQ

Equine asthma is a chronic inflammatory condition that compromises the respiratory system's defenses, making horses more susceptible to other respiratory diseases. Persistent inflammation damages the airway lining, impairs mucociliary clearance and disrupts immune responses, allowing pathogens such as bacteria, viruses and fungi to "take hold" more easily. Over time, airway remodeling, characterized by thickened bronchial walls and increased smooth muscle mass, further reduces lung function and worsens the effects of concurrent conditions like bacterial or viral pneumonia. The airflow limitation and immune dysregulation caused by asthma not only increase the severity of coexisting diseases but also complicate diagnosis and treatment, highlighting the importance of proactive asthma management, as described by Laurent Couëtil, DVM, PhD, DACVIM-LAIM, Purdue University College of Veterinary Medicine.

Rebecca Wilkes DVM, PhD, DACVM (virology and bacteriology/mycology), University of Kentucky Veterinary Diagnostic Laboratory, highlights the development of newer molecular approaches used in veterinary diagnostic laboratories, particularly at the UKVDL. Syndromic testing, whereby panels of tests frequently based on body system are grouped and assayed using a molecularly based platform, is increasingly common in diagnostic laboratories. Wilkes features the latest advances that she and others have developed that enable rapid and comprehensive detection of multiple equine pathogens in a single assay.

Equine Grass Sickness, also known as equine dysautonomia, is a rare but often fatal disease that affects the autonomic nervous system of horses, primarily in the United Kingdom and parts of northern Europe. The condition leads to severe dysfunction in the nerves controlling involuntary bodily functions, especially those related to the gastrointestinal tract. Sophie McCullagh, BVSc MRCVS, and Bruce McGorum, BSc BVM&S MSc PhD Cert EM (Int. Med.) DipECEIM MRCVS, both from the Royal (Dick) School of Veterinary Studies – University of Edinburgh, United Kingdom, provide an update on Equine Grass Sickness, where they outline the rationale for pivoting from a hypothesis of EGS being caused by toxins produced by the bacterium that causes botulism to the possibility of a toxin related to one found in several families of venomous snakes (neurotoxic phospholipase A2). While the exact toxin and its source remain elusive, identifying this putative toxin and understanding how it causes disease may also shed light on diseases other than just EGS, included in a family of neurologic diseases (dysautonomias) found across several species. McCullagh and McGorum provide an overview of newer research techniques and potential treatments that signal important progress being made in thwarting Equine Grass Sickness.

We hope this issue is informative and we welcome your feedback on any topics you'd like our editors to consider in upcoming publications.

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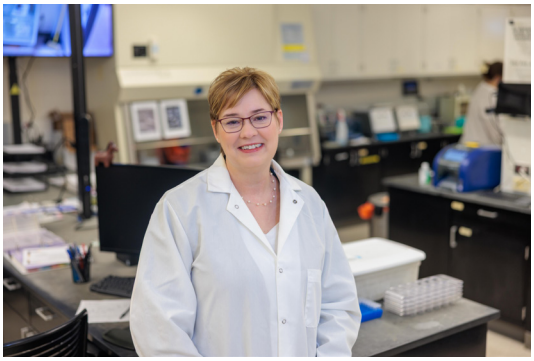
A New Chapter at UKVDL: Advancing Equine Diagnostics Together



Dr. Rebecca Wilkes. Photo by Matt Barton, UK Martin-Gatton College of Agriculture, Food and Environment.

Hello, equine community! I'm Dr. Rebecca Wilkes, and I'm honored to introduce myself as the new director of the University of Kentucky Veterinary Diagnostic Laboratory (UKVDL). I stepped into this role on June 1, 2025, and it's been an exciting whirlwind of change and opportunity ever since.

I'm a Tennessee native, but I come to Kentucky by way of Indiana, where I spent nearly seven years as the section head for molecular diagnostics at the Animal Disease Diagnostic Laboratory at Purdue University. I also served as an associate professor in the Department of Comparative Pathobiology. My background includes a DVM and a PhD in molecular virology from the University of Tennessee, and I'm a board-certified veterinary microbiologist. My passion lies in molecular diagnostics, especially next-generation sequencing (NGS), and I'm thrilled to bring that expertise to UKVDL.

One of the first major transitions I've seen in the lab is welcoming a new diagnostic services veterinarian. With the retirement of Dr. Deborah Maples, we were fortunate to bring Dr. Kindra Orr on board. Dr. Orr joined us on Sept. 2 and brings a wealth of equine experience. She earned her DVM from Colorado State University and completed both a medicine and surgery internship and an internal medicine residency at Rood and Riddle Equine Hospital. Her clinical insight and dedication to equine health make her a fantastic addition to our team.

We also said goodbye to a pillar of our lab, Dr. Erdal Erol, who retired after 15 years of service. Dr. Erol led multiple sections and made significant contributions to equine diagnostics. His work helped identify multidrug resistance in *Rhodococcus equi* in foals, characterized bacteria linked to nocardioform placentitis, discovered Rotavirus B in foals and goat kids and sequenced *Clostridium piliforme*, the elusive agent behind Tyzzer's disease in horses. His legacy is profound, and we're currently searching for a new bacteriologist/mycologist to continue leading that section.

Dr. Erol also laid the groundwork for syndromic diagnostic panels and established our NGS section—work that aligns closely with my own. At Purdue, I focused heavily on NGS applications, and I'm now expanding that work here at UKVDL. My goal is to enhance our molecular diagnostics by developing additional PCR assays and implementing targeted NGS (tNGS) for syndromic testing.

So, what is syndromic testing, and why does it matter for equine health?

Syndromic testing allows us to detect multiple pathogens that cause similar clinical signs, all in one test. For example, an equine respiratory panel might include equine influenza virus, equine herpesvirus types 1 and 4 and *Streptococcus equi* (Strangles). This approach improves diagnostic accuracy, supports better infection control and promotes more responsible use of antimicrobials, especially important as antimicrobial resistance continues to rise.

We use two primary molecular methods for syndromic testing: multiplex PCR and next-generation sequencing. Multiplex PCR is a technique that amplifies the DNA or RNA of pathogens in a sample. It's fast and reliable but limited to detecting three or four pathogens per assay. To cover more ground, we often run multiple PCRs in parallel. The benefit is speed—we can typically generate results the same day we receive the sample.

NGS, on the other hand, is a powerful tool that sequences DNA to identify pathogens based on their unique genetic fingerprints. Unlike traditional sequencing, which was slow and expensive, NGS allows us to analyze all DNA in a sample simultaneously. This approach, called metagenomics, can detect a wide range of pathogens, though sensitivity can be a challenge due to the abundance of host DNA.

That's where targeted NGS (tNGS) comes in. By amplifying pathogen DNA before sequencing, we can create large panels that detect numerous pathogens across multiple syndromes. This is my specialty, and I'm excited to implement tNGS here at UKVDL to elevate our diagnostic capabilities.

As I settle into this role, my focus remains on strengthening UKVDL's diagnostic capabilities and ensuring our services meet the evolving needs of the equine industry. Through collaboration, innovation and scientific rigor, we are committed to supporting the health and vitality of the horses that define this region and beyond. I look forward to the work ahead and to contributing meaningfully to the future of equine diagnostics.

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Photo by Matt Barton, UK Martin-Gatton College of Agriculture, Food and Environment.

Understanding Equine Asthma: What Every Horse Owner Should Know

Asthma isn't just a condition in people—it affects horses too. In fact, equine asthma is one of the most common chronic respiratory problems veterinarians see. It can impact any horse, from backyard companions to elite athletes, and ranges from subtle performance issues to severe breathing difficulties. The good news is that, with awareness and proper management, most horses with asthma can live comfortable, useful lives.

What Is Equine Asthma?

Equine asthma is an umbrella term used to describe chronic, non-infectious airway inflammation in horses. You may have heard older terms such as heaves, recurrent airway obstruction or inflammatory airway disease. Today, veterinarians group these conditions under "equine asthma," which better reflects their similarity to human asthma.

There are two main forms.

- Mild to moderate asthma: Seen commonly in younger horses, especially those in training or competing (80% of Thoroughbred racehorses have mild asthma). Signs can be subtle—occasional coughing, nasal discharge or decreased performance—while the horse otherwise appears healthy. Frequently, horses show no overt signs of mild asthma.
- Severe asthma: Typically affects mature to older horses. Signs include frequent coughing, labored breathing at rest, flared nostrils and reduced tolerance for exercise. Horses usually show signs seasonally, typically during winter when fed hay, but others show signs during summer pasture turnout.

What Causes It?

The key trigger is exposure to dust and airborne irritants (allergens). Horses are exposed to millions of microscopic particles every day, especially when kept in stables. Common culprits include:

- Hay dust and molds. Even good-quality hay contains microscopic mold spores capable of triggering asthma. Round bales and hay nets/racks result in the highest exposure to dust.
- Straw bedding – produces more respirable dust than low-dust options like shavings or paper.
- Poor ventilation – traps dust and ammonia inside barns.
- Seasonal allergens – molds and pollens outdoors can trigger pasture-associated asthma during summer.

Other factors, such as genetics, immune sensitivity and possibly bacteria or viruses, may contribute, but dust and mold exposure remain the biggest drivers.

Recognizing the Signs

Asthma may develop gradually, and many early signs are subtle. Watch for:

- Coughing, especially during exercise (not all horses with asthma cough).
- Slower recovery after work or reduced performance.
- Increased respiratory effort—flared nostrils, abdominal "heave line" or breathing difficulty at rest in severe cases.

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Because these signs can mimic infections or other conditions, a veterinarian's evaluation is important.

How Is It Diagnosed?
Veterinarians diagnose equine asthma using a combination of history, physical examination and sometimes additional tests. Endoscopy can reveal excess mucus in the airways, while a bronchoalveolar lavage — a wash sample from the airways in the lungs — helps identify airway inflammation. Lung function testing is available at specialized centers.

Managing Equine Asthma
Most horses with mild to moderate asthma will recover with proper management. While there is no cure for severe asthma, management can greatly improve the quality of life. The most effective approach combines environmental changes with, when necessary, medical treatment.

- Environmental Strategies

  Since dust and molds are the main triggers, reducing exposure is key:
  - Turnout: Pasture living is often the best environment, as it dramatically lowers dust exposure. However, horses with summer-pasture asthma do better in the barn when outdoor allergens are high.
  - Feed adjustments: Replace dry hay with haylage, hay cubes/pellets, steamed hay or soaked hay.
  - Bedding: Avoid straw; use low-dust options such as wood shavings, paper or specialized dust-free products.
  - Barn ventilation: Keep windows and doors open when possible; avoid sweeping or feeding hay from hay nets/racks.

  These changes can make a big difference, but it may take five to six weeks to see the results.

- Medical Treatment

  When environmental management alone is not enough, or to hasten recovery, veterinarians may prescribe medication:
  - Corticosteroids: Reduce airway inflammation. These may be given orally, by injection or as an inhaled therapy. Inhaled steroids are increasingly preferred because they deliver the drug directly to the lungs with fewer side effects.
  - Bronchodilators: Relax airway muscles to ease breathing. These provide relief but are best used alongside steroids, since they don't control inflammation.
  - Other therapies: Supplements such as omega-3 fatty acids greatly benefit some forms of asthma (neutrophilic), especially when combined with a reduction in dust exposure. The most effective omega-3 supplements are from marine sources (e.g., algae and fish oil).

Living With a Horse with Asthma
Asthma is a common condition, but horses can do very well with proper management. Many continue to train and compete successfully. The key is recognizing early signs, minimizing dust exposure and working closely with your veterinarian to tailor a management plan.

Owners often find that once they understand asthma's triggers, they can prevent many flare-ups and reduce the need for long-term medication. Recent research showed that wearable dust monitors help identify sources of dust exposure. Hopefully, commercially available devices will soon help owners and veterinarians better manage asthma.

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Third Quarter 2025

International Report on Equine Infectious Diseases

This report collates information on equine infectious diseases provided by diagnostic laboratories in Lexington, Kentucky, the University of Kentucky Veterinary Diagnostic Laboratory (UKVDL), and Equine Diagnostic Solutions (EDS), Inc. We further included information from the International Thoroughbred Breeders Federation, the International Collating Centre (ICC) in Newmarket/Cambridge, United Kingdom, and information from the American Association of Equine Practitioners' Equine Disease Communication Center (EDCC). Some information became available by word-of-mouth and is likely incomplete or (yet) unconfirmed by official sources.

Lexington and Kentucky: Rabies was diagnosed in an unvaccinated horse in Central Kentucky. In addition, several cases of West Nile Virus (WNV) infection were diagnosed here. While WNV is seasonal due to peak vector activity (mosquito), the disease is mainly found in unvaccinated/*under*vaccinated horses. Another 'seasonal' disease is Potomac Horse Fever (caused by *Neorickettsia risticii*) with diagnostic samples positive by PCR.

A total of 26 fetuses/neonatal deaths was submitted to UKVDL; one-third were Thoroughbreds. Information on the stage of pregnancy has not been provided. Viral causes for pregnancy loss cases were not identified. Consistent with season, the Lexington laboratories report few samples of Rotavirus detection, and few samples positive for *Rhodococcus equi* for this area.

Equine Influenza (EI) has been reported sporadically in North America and Europe. Two outbreaks of EI with unknown extent have been reported from India and Ecuador.

Summer season in the Northern Hemisphere comes with increased mosquito activity. Without surprise, case numbers of horses with WNV have skyrocketed. WNV cases have been reported coast-to-coast in North America and from continental Europe (Italy, France, Germany and Balkan countries). Of concern is the expansion and shifts of WNV endemic areas, in particular in France, where an endemic region spans from the southwest of France to almost Paris.

With mosquito season at its peak, it is not surprising that we also see a surge in Eastern Equine Encephalitis virus (EEEV) cases along the eastern half of United States including the Canadian province of Ontario. Sadly, but true to our prediction, most cases are in unvaccinated or *under*vaccinated horses. Neither WNV nor EEEV from infected horses can transfer into people. However, diseased horses in endemic regions are indicators for the increased risk of viral infection into humans through vectors (mosquito).

Another seasonal disease in North American horses is Potomac Horse Fever. The disease is caused by *Neorickettsia risticii* with a complex replication cycle in trematodes and aquatic insects (caddis flies); it is a recognized cause of colitis (often) and may be accompanied by laminitis. It has been reported from several (endemic) areas, often associated with large waterways in North America.

A northern migration of New World Screwworm from Central America towards the United States border keeps veterinary regulatory bodies busy (see July issue of the EDQ).

Streptococcus equi spp. equi, the causative agent of 'strangles,' has been reported from across the continent and from 'throughout Europe.'

Several Equine Infectious Anemia (EIA) cases have been detected in the (South)Western United States, with some cases linked to a nosocomial spread in Texas and subsequent backtracking efforts of the regulatory authorities (see July EDQ). Balkan countries report incidental EIA this quarter. Incidental reports also come from Northern Europe and are the result of syndromic testing ('anemia – differential diagnosis'). This has led to temporary closure with quarantine of an equine/veterinary care facility in Germany.

As EHV-1 infections cause abortions commonly during late pregnancies, only a few countries from Europe and North America reported cases of EHV-1 abortion. Not surprisingly, Australia reported EHV-1 abortion cases at this time. In addition, Australia reported a single case of EHV-1 associated myeloencephalopathy (EHM) near Brisbane. This is a rare diagnosis; outbreaks of EHM in the Southern Hemisphere are rare and certainly when compared to the numbers of North America and Europe. The latter areas reported only few cases of EHM for this quarter. This is not a surprise as EHM is seasonal disease for (fall,) winter and spring months.

In addition to EHV-1 activity down under, Australia also reported a case of Hendra infection.

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Grass Sickness Update

Equine grass sickness (EGS) is a frequently fatal, multisystem neuropathy killing approximately 1% of grazing horses in high-risk areas. Until recently, the disease pathogenesis has remained largely unknown, resulting in difficulties in diagnosis and lack of treatment options, with devastating consequences for clinicians and horse owners.

Recent studies have shown that EGS is associated with major changes in skeletal neuromuscular junction (NMJ) ultrastructure that are not consistent with the effects of botulinum neurotoxins, which were previously proposed as the cause of EGS. Instead of the dense packing of synaptic vesicles (SV) at the active zones of the presynaptic membrane seen in botulism cases, EGS is characterised by marked depletion of SVs, Ω shaped invaginations in the presynaptic membrane, accumulation of neurofilament-like material in terminal boutons and, ultimately, bouton degeneration. Montecucco and Bano highlighted that these NMJ changes were very similar to those seen in animals envenomed with snake venom containing neurotoxic phospholipase A2 (nPLA2) leading to a proposal that nPLA2 is the likely cause of EGS. It is also hypothesised that these neurotoxins are responsible for the dysautonomias seen in cats, dogs, hares, rabbits, llamas and alpacas.

Consistent with this hypothesis, a striking similarity has been identified between the clinical signs seen in envenomed human patients and horses with EGS. Both horses and humans show signs of abdominal pain, abdominal distension and lack of bowel movement early in the disease course.

Progression leads to involvement of cranial nerves and axial muscles, resulting in some of the characteristic clinical signs associated with EGS, including bilateral ptosis (eyelid drooping) and dysphagia, which often results in aspiration pneumonia. Dysautonomia also leads to abnormal heart rate, resulting in the profound tachycardia observed in equine patients despite management of pain and hydration status. Human patients also report abnormal taste and smell, which is likely but not confirmed in EGS cases.

The main differences between the clinical signs is the predominance of gastrointestinal signs in horses with more pronounced signs of respiratory muscle paralysis and muscular weakness/rigidity in humans. The hypothesis for this difference is that an enteric route of intoxication is proposed in EGS as opposed to a haematogenous and lymphatic spread in human snakebite victims. The initial depolarising block induced by nPLA2s may account for the previously unexplained skeletal muscle fasciculations and the marked small intestinal dysmotility that is grossly visible during exploratory laparotomy in acute EGS horses, with uncoordinated contractions leading to a failure of peristalsis.

In order to definitively prove this hypothesis, the presence of the nPLA2 in biological samples from affected horses needs to be demonstrated. Work is underway to utilise proteomics, lipidomics and metabolomics to confirm this. This is proving very challenging as PLA2s are ubiquitous, diverse in size and structure and likely bind rapidly to target receptors resulting in low tissue/plasma concentrations. The exact nPLA2 responsible for the disease also remains unidentified. Based on the epidemiology of the disease, plausible sources of the nPLA2 include ingestion of a microbial or plant PLA2 or microbial production in vivo by gastrointestinal microbes. As well as providing an explanation for the EGS-associated NMJ abnormalities and clinical signs, this hypothesis also raises novel therapeutic options. Interestingly, snake envenomation is associated with induction of a pro-regenerative intercellular signalling axis. This

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involves melatonin-melatonin receptor 1 (MT1) interactions which lead to reinnervation as early as five days after envenomation in mice and after several weeks in envenomed human patients. Ramelteon, a highly selective MT1 agonist, which is currently used to treat insomnia in people in the U.S., has been shown to be a strong promoter of the neuroregeneration after paralysis induced by venom from Bungarus species (venomous snakes) in mice. This led to a proposal to trial Ramelteon in envenomed humans to determine whether this drug can reduce clinical consequences and promote neuroregeneration.

Due to its use in insomnia treatment, large meta-analyses have been carried out into the use of ramelteon in humans indicating that it is generally well-tolerated with common adverse effects including drowsiness, dizziness and nausea. Murine models also suggest good safety margins with intravenous administration. A treatment trial of intravenous Ramelteon in acute and sub-acute EGS cases is currently underway at the Dick Vet Equine Hospital, University of Edinburgh.

Significant recent breakthroughs have been made in our understanding of EGS pathogenesis, but further work is required to develop effective methods to prevent and treat this devastating disease.

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