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## Infectious Disease Topics at the AAEP Convention

By Christy West

**A**mong topics discussed at the 2008 American Association of Equine Practitioner's Convention, held Dec. 6-10 in San Diego, Calif., were a number of practical topics that equine veterinarians could take home and apply to their clients' horses. Convention organizers devoted an entire morning to the Medicine: Infectious Diseases session, and here are a few of the take-home messages.

We're all familiar with the medical/veterinary axiom: First, do no harm. A recent Colorado State University study extended this principle to biosecurity for ambulatory veterinarians: First, don't bring any diseases into a patient's stall, and don't take any out to spread to other patients.

For this study, researchers investigated the durability of four types of disposable overboots to see which held up to typical ambulatory practice walking and, thus, might provide the best protective barrier to avoid spreading disease. Dr. Josie L. Traub-Dargatz, professor of veterinary clinical sciences at CSU, presented the results.

"Personal protective equipment is an important component of a complete biosecurity program," said Traub-Dargatz. "Boots need to be affordable, durable, waterproof, readily available, and easy to put on and take off, or people won't use them. Options (for footwear) include disposables or reusable boots you disinfect; for the latter you need to have a way to make up disinfectant, a container for the disinfectant, and a scrub brush. Most ambulatory practices don't carry all this stuff, which leaves disposables."

The disposable overboot study involved veterinary students walking a 265-foot course over gravel, concrete, and rubber stall mats wearing each of four commonly available boot types: clear plastic boots from Continental Plastic Corp., blue plastic boots from Jorgensen Laboratories, and lightweight/heavyweight yellow boots from Global Protection. Boot prices ranged from \$0.30/pair for the clear boots to \$2.32/pair for the lightweight yellow boots. Porosity of the boots (how much water they leaked) was measured by pouring two liters of water into each boot after the course had been walked and measuring how much leaked out in one minute.

Unsurprisingly, the heavier-weight yellow boots (both heavy and light) fared better than the clear and blue boots; one lightweight yellow boot leaked, compared to none of the heavy yellow boots, 83% of the clear boots, and 92% of the blue boots. The blue boots also leaked the highest average volume of water—209 mL, compared to 58 mL for the clear boots and 0.7 mL for the lightweight yellow boots.

"The blue and clear boots were the most affordable, but the least durable," Traub-Dargatz summarized. "The heavy yellow boots were the most durable, followed closely by the light yellow boots. Most students felt the light yellow boots were easiest to put on and take off. All of these boots were noisy to walk in, so keep your safety in mind; some horses may be hyperexcitable to the noise. "If you're only going to put on the boots to go in the stall and take them off when you come out, the clear/blue boots may be OK, but if you'll be walking on concrete or gravel, their durability is questionable," she noted. "Pick the right size/style boots for your needs, and keep them with you always in case you need to examine contagious cases."

Methicillin-resistant *Staphylococcus aureus* (MRSA) bacterial infections have become hot news lately, especially among horse people. This topic likely won't die down soon because recent research shows that MRSA is up to 10 times more common in equine veterinarians than in the general population—and that it can spread from horses to humans.

"MRSA appears to be an occupational risk factor for large animal veterinarians," noted Dr. Maureen Anderson, postdoctoral fellow in the Department of Pathobiology of the University of Guelph in Ontario, Canada.

During her discussion of MRSA biology, prevalence, and recent research, she reported that MRSA can cause many different problems, from superficial skin/soft tissue infections to necrotizing (tissue-killing) pneumonia. Some hospital-associated strains in humans are resistant to multiple classes of antibiotics, leaving very few effective treatment options for people who become infected. There is increasing concern that some strains might ultimately develop resistance to these few remaining antibiotic weapons.

The general human population has an estimated 0.2-3.5% MRSA colonization rate (carrier state), and contact with horses and pigs appears to increase one's risk of MRSA colonization, noted Anderson. Some studies have shown that large-animal veterinary personnel are up to four times more likely to be colonized than the general population; nearly 16% of large-animal veterinary personnel at a veterinary internal medicine conference were colonized, compared to 4.4% of small-animal veterinary personnel. And at the 2006 AAEP convention 10.1% of the equine veterinary personnel tested were colonized.

Not all types of MRSA are created equal; there are several different strains with different capabilities. The ST398 form, for example, is often associated with food animals in Europe, but it is now also being found in horses.

This type of MRSA seems to readily cross species barriers; it has a high potential for zoonotic transmission (transmissible between animals and humans)," Anderson commented.

In contrast, she reported that CMRSA-5 and closely related strains are most common in horses, but they are fairly uncommon in people, suggesting that they might be adapted to survival in horses. The CMRSA-5 type was most common in the AAEP 2006 attendees, present in 54% of the positive subjects.

It seems clear that MRSA can spread from horses to humans. Anderson reported one incident occurring in an equine intensive care unit where contact with a foal colonized with MRSA resulted in skin infections in three personnel and colonization of 10 others. Another incident involved a skin infection of a veterinary resident's tattoo site; the MRSA strain was the same as that in two equine patients the resident had been attending.

While few studies on MRSA risk factors have been done in horses, Anderson reported that colonization is (logically) a risk factor for active infection. Other equine risk factors for MRSA colonization include: \

Administration of ceftiofur or aminoglycoside antimicrobials in hospitalized horses (this might be related to conditions/ weakened immune systems requiring antimicrobials, rather than the antimicrobials themselves).

On admission to hospitals, additional risk factors include administration of antimicrobials within 30 days of hospital admission; admission to a neonatal intensive care unit or nonsurgical service; and residence on a farm on which a horse was previously diagnosed with MRSA.

Residence on a farm with more than 20 horses is a risk factor for MRSA colonization of horses in the community. Luckily, "It seems that the majority of horses are not persistently colonized and will clear the MRSA on their own if re-exposure can be prevented," Anderson said. "Therefore, drug therapy is not advocated unless clinical signs of infection are present.

"Instead, to prevent widespread MRSA colonization, quarantine infected or colonized horses and gradually move them to clean herds (or groups) once they test negative.

According to the AAEP 2006 study, risk factors for MRSA colonization in veterinary personnel include diagnosis of MRSA colonization or infection within the last year and treatment of a horse diagnosed with MRSA in the last year. Protective factors include washing hands with soap and water between potentially infectious cases and between visits to different farms. Anderson noted that one study showed that alcohol-based hand sanitizers were even more effective at reducing bacterial counts on the hands than antibacterial soap and water. However, she also noted that these are most effective when used on hands that aren't visibly dirty; thus, washing hands before applying hand sanitizers might be the most effective approach.

"I cannot possibly emphasize enough how important it is to treat MRSA based on culture and sensitivity results (to identify what drugs will kill the bacteria before treating the infection)," advised Anderson. "Don't crack a walnut with a sledgehammer; vancomycin is not a first-line antimicrobial. MRSA in horses is not at the point it is in human hospitals where the bugs are so resistant to everything that they need vancomycin. In horses we can still use other drugs. Use local therapy wherever possible; wound debridement and lavage can go a long way toward decreasing the amount of antimicrobials used.

"Equine MRSA is not going away; we're going to have to deal with it," she summarized. "We need controlled studies to evaluate risk factors in hospital/community equine populations, and we must increase awareness of its zoonotic potential and the design/ use of infectious disease control protocols. Hygiene and barrier protocols (such as gloves, gowns, and boot covers) are the keys."

Ivermectin has become one of the most widely used deworming medications worldwide since its introduction 25 years ago. It's usually considered to have a large margin of safety, but it can be highly toxic in rare circumstances, one possibility being when a horse eats silver nightshade and is dewormed with ivermectin around the same time. Dr. Tamara Swor, clinical assistant professor of veterinary medicine at Texas A&M University, discussed three cases of ivermectin toxicity.

The three affected Quarter Horses were all dewormed with the recommended dosage of ivermectin (0.2 mg/kg) about 18 hours before clinical signs were noticed. Two other horses on the farm with identical management, except for not being dewormed, were unaffected (the owner had only three tubes left in the box). Dewormer from the same box had been used before on the same horses with no ill effects.

The affected horses ranged from 4 to 13 years old. All had essentially normal temperatures, pulses, and respiration rates, but each also had progressive bilateral mydriasis (pupil dilation in both eyes), decreased pupillary light reflex, ataxia (incoordination) in all four limbs, and decreased response to menacing movement (they didn't "flinch" as readily). Two horses were depressed, mentally dull, and had flaccid lips while one was hypersensitive and agitated; the latter was euthanized when her signs progressed to the point that she was dangerous to herself and her handlers. The remaining two horses recovered fully (one within days, the other within a few months) with supportive fluid treatment and flunixin meglumine (Banamine).

Swor explained that ivermectin normally does not cross the blood-brain barrier and enter the brain, but if it does (as can happen in susceptible dog and cattle breeds), it can cause toxic signs such as those seen in these horses. The euthanized horse's brain had 131 parts per billion of ivermectin, which Swor noted was consistent with toxic levels in dogs. "No animal should have ivermectin in its brain," she commented.

The horses' hay and water, along with the ivermectin remaining in the used tubes, all tested clean of contaminants, and no toxic plants were found in the euthanized horse's stomach. But researchers still believe that nightshade ingestion might have been a factor, due to previous research showing that nightshade impaired the blood-brain barrier of rabbits. These findings were published in a brief discussion in a toxicology textbook and in a previous article about ivermectin and silver nightshade in *The Horse*.

"Ivermectin toxicosis is uncommon in mature horses, but it can occur even at the appropriate dosage, and there may be similar implications for moxidectin and other related products as well," Swor concluded. "Further studies are needed to determine the role of toxic plants. Silver nightshade toxicity in these horses is unproven, but it could have been a factor. The magnitude of clinical signs in horses is variable; signs include those previously discussed. Consider ivermectin toxicosis in horses with acute neurologic impairment especially right after antiparasitic medications have been given. Long-term complications are unknown, but recovery is possible with supportive care." *Editor's note: Silver nightshade is primarily found in semiarid regions around the world. In the United States this includes the American Southwest and Pacific Northwest. It might also be found in hay produced in these regions.*

*Clostridium difficile* bacteria can cause severe, sometimes fatal colitis in horses. When a horse develops severe diarrhea (particularly if blood is present), *C. difficile* might be suspected, but veterinarians must confirm the infection to make sure they treat the right organism. Toward that end, Dr. Carlos Medina-Torres, a DVMSc candidate at the University of Guelph in Ontario, Canada, presented a study evaluating the performance of the *C. difficile* TOX-A/B II ELISA test in horses at the convention.

*C. difficile*-associated disease is on the rise, said Medina-Torres. "This increase is responsible for increased morbidity (illness) and a substantial economic burden due to excess mortality and longer hospital stays," he commented. "There may be more pathogenic strains emerging." He estimated that severe equine cases cost about \$3,000 or more to treat (\$7,000 is typical for treating humans).

Medina-Torres reported the ELISA test is widely used in horses, but its performance hadn't been validated. It's very sensitive and specific for humans and pigs, but not for dogs. Thus, his group set out to validate the test. They found the ELISA test had a sensitivity of 84%, a specificity of 96%, and good agreement (93%) with the "gold standard" cell cytotoxicity assay.

"Our conclusions were that the test is a reliable, practical (costing less than \$10 per sample) test for the clinical diagnosis of *C. difficile*-associated disease in horses," Medina-Torres summarized.

Infection with *Lawsonia intracellularis* (most often seen in weanlings) can cause edema (fluid swelling) beneath the abdomen and in the lower limbs, lethargy, anorexia, diarrhea, fever, colic, and weight loss. It is a "true emerging disease with more cases every year," according to Dr. Nicola Pusterla, associate professor of veterinary medicine and epidemiology at the University of California, Davis.

Pusterla discussed the effectiveness of three vaccination strategies against *L. intracellularis*, which causes proliferative enteropathy (a spreading intestinal disease). "Although the clinical entity (*L. intracellularis* infection), diagnostic evaluation, and treatment of affected foals have been well-established and described, preventive measures have remained largely unaddressed," he noted. Pusterla et al. investigated the immune response and fecal shedding of *L. intracellularis* following two doses of a modified-live vaccine (Enterisol Ileitis from Boehringer Ingelheim Vetmedica) given orally or intrarectally three weeks apart. Fifteen healthy, *L. intracellularis*-negative foals were divided into three groups of five, with one foal in each group remaining unvaccinated as a sentinel.

Group 1: Vaccinated orally without premedication.  
Group 2: Vaccinated orally following premedication with a proton-pump inhibitor to reduce stomach acidity (omeprazole, GastroGard).  
Group 3: Vaccinated intrarectally.

The researchers reported the following: Intrarectal administration of vaccine

Intrarectal administration of vaccine induced seroconversion (production of detectable antibodies) in all foals after only one dose while only two foals in Group 2 and zero Group 1 foals seroconverted after one dose. Both oral vaccine groups had one nonresponder (no detectable seroconversion). Fecal shedding of *L. intracellularis* occurred mostly in Group 3 foals up to 15 days after the first dose. GastroGard premedication appeared to help the vaccine induce a stronger, earlier antibody response when given orally. No adverse reactions were noted in any foals. No sentinel (unvaccinated) foals seroconverted, indicating no exposure to virulent *L. intracellularis*.

"We are in the process of refining the vaccination protocol and working with lower doses and different vaccine preparations (two forms are on the market)," said Pusterla. Challenge studies and field efficacy trials to determine protection with the vaccine are in the works.

Those who keep horses at home always struggle to keep up with regular farm and barn maintenance and have enough time left to enjoy the horses. Performing proper building maintenance at regular intervals can save money and make the structure safer and can leave you more time to spend with the four-footed critters, writes Jeannie Many. Many tasks can be accomplished on an as-needed basis, leaving some simple safety checks and maintenance for each season. Whether your farm includes a barn, sheds, or outbuildings, pre-existing structures is the first step. Barn design and placement can help reduce monthly maintenance, but what about pre-existing structures? If you have a barn you inherited, learn where your problem areas are and be prepared to address them," said Mary Harcourt, co-author of *Complete Plans for Building Horse Barns Big and Small*. "That'll eliminate a lot of maintenance."

Many farm owners who live in colder climates use insulated buckets or bucket heaters. Farm owner Erin Novelli recommends cleaning them before they are stored so all that's left to do is hang them up come winter. Those with automatic waterers should check the heating element before temperatures dip below freezing. Some maintenance tricks are learned the hard way in winter, said Novelli, such as digging around barn doors so they don't freeze in their tracks. She also oils the top track of sliding doors. Because her first foals are born in January, Novelli spends much of the winter busily preparing for their arrival. This includes disinfecting buckets and stalls and checking foaling cameras before mares arrive. Most of the maintenance around the farm should be done on a daily basis. Larry Swetnam, a retired University of Kentucky agricultural engineer, recommends not putting floodlights or spotlights near hay storage because dust, cobwebs, and hay are incredibly flammable. Always be aware of how barn upkeep could affect your horse's health. Check smoke detectors and batteries as well as fire extinguishers every time there is an extreme change in weather. If you have to clean manure or urine off of a surface where there is little to soak it up, apply some hydrated agricultural lime. And make sure the ground underneath stall mats is level. Maintenance is a normal part of horse farm ownership, but if it is practiced regularly it will promote safety and preserve farm structures.

According to a study published by researchers at Texas A&M University, a triad of factors—namely sex, breed, and age—are all associated with the development of cervical vertebral compressive myelopathy, writes Dr. Stacey Oke in February.

"CVCM is a catchall phrase for cervical lesions that result in general ataxia (incoordination) and weakness in horses by compressing the spinal cord," said lead author Dr. Jonathan Levine. Examples of these lesions include vertebral canal stenosis (narrowing), tipping of the vertebral bodies (the bone through which the spinal cord passes), and articular process osteophytosis (bony remodeling). While researchers have attempted to evaluate the risk factors for CVCM in previous studies, no large-scale, systematic study to assess the impact of sex, breed, and age has been reported. Thus, Levine and colleagues collected data from 811 horses diagnosed with CVCM and 805 control horses examined at 22 different institutions between July 1974 and August 2007.

According to Levine, "Statistical analysis showed that geldings and stallions were 2 and 2.4 times more likely to have CVCM than female horses, respectively, and that Thoroughbreds, Tennessee Walking Horses, and Warmbloods were more often diagnosed with CVCM than Quarter Horses." Horses younger than 7 were significantly more likely to have CVCM compared to horses more than 10 years of age.