More Top Equine Studies of 2011

CHRISTY WEST

Joint disease treatment should aid in a horse's performance without attempting to eliminate the body's natural response to injury

Held annually, the American Association of Equine Practitioners convention provides continuing educational opportunities for veterinarians, allowing them to gain information on what is new in research, to learn the latest on the cutting edge of technology, and to acquire invaluable insight from the experts. The April 28 issue of *The Blood-Horse* provided readers with some of the highlights from the 2011 AAEP convention, conducted this past November in San Antonio, Texas. This month's Trade Zone continues looking at some of the topics of interest from that convention.

Gastrointestinal Tract Medicine

Dr. Steve Reed, associate at Rood & Riddle Equine Hospital in Lexington, discussed several studies on the equine gastrointestinal (GI) tract. The first study he discussed involved a review of non-steroidal anti-inflammatory drugs' (NSAIDs) effect on equine intestines; he noted veterinarians have observed side effects including gastric ulceration and right dorsal colitis, especially

when using these drugs to treat endotoxemia. Through their research, the team confirmed that extended use of NSAIDs causes damage to the intestinal mucosal barrier, which leads to a loss of normal barrier function (against some common antigens and pathogens).

Reed then shifted gears to discuss a study focusing on *Lawsonia intracellularis*, an organism that causes protein loss and GI issues in weanling foals.

He stressed that infection with the bacterium causes a thickening of the intestinal walls, which leads to malabsorption of protein and a low daily weight gain, and veterinarians are diagnosing an increasing number of cases. Further, he noted, the treatment of choice, oxytetracycline, does not seem to be as effective as it used to be; some cases simply do not respond optimally. *—Erica Larson*

Joint Therapies

Part of a horse's athletic success depends on his joint health, and veterinarians continually study how best to maintain joints and manage injury. Surgeon Larry Bramlage, of Rood & Riddle Equine Hospital described joints' lubrication mechanisms and how joints respond to injury.

Typical and consistent signs arise in horses with joint damage: lameness and joint distension. While the human impulse is to "fix" these types of signs, Bramlage said these very clinical signs are "a superficial part of the joint's response to insult."

A joint's interior consists of articular cartilage covering the bone ends and synovium lining the inside of the joint capsule. Both cartilage and synovium are bathed in fluid, but they are lubricated by different means and respond differently to insult.

Hyaluronic acid (HA) lubricates synovium, while water lubricates cartilage through a "sponge" mechanism. Weight-bearing compresses cartilage and fluid is forced out, preventing friction. Proteoglycan in the cartilage matrix reinflates it, and more proteoglycan means better inflation. Joint insults can exhaust proteoglycan supplies over time. When proteoglycan can no longer restore the water in the matrix, lack of lubrication produces wear and tear.

Loss of lubricating HA allows an influx of protein and fibrin into the joint, he noted. Fibrin collects debris and sticks it to the synovial villi (carpetlike projections) to prevent it from circulating in the joint. Then the synovium must eliminate it. But the debris removal process and associated inflammation cause the villi to stick together and lose their capability to collect additional debris. If this situation continues, the joint eventually exhausts the villi and loses its ability to produce HA. The result is chronic effusion, or joint fluid buildup.

Bramlage points out the problem with a damaged joint: It is "difficult to improve upon the joint's normal response (to insult), but that normal response might not allow performance. Treatment then must aid in performance without trying to eliminate the joint's natural response to injury."

Stem cells for joint disease

David Frisbie, DVM, of Colorado State University, described using mesenchymal stem cells (MSCs) to treat joint disease (one goal of which is resurfacing articular cartilage), addressing sources, processing methods, and efficacy. Clinical sources of MSCs include bone marrow and adipose (fat) tissue, but Frisbie said bone marrow is the superior source. Allogenic (fetal) stem cells are also an option, but they are expensive and little is known about how they differentiate.

Processing methods for bone-marrow and adiopose-derived MSCs include:

■ Direct aspirate involves using cells straight from harvest (no processing) and yields low numbers.

■ Concentration (by filter/centrifuge) yields higher concentrations, access to

platelet-rich plasma, and costs less, but total cell numbers remain low.

■ Expansion (by cell culture) produces good numbers, but it's expensive and requires shipment and a two-to-three-week turnaround.

A veterinarian can suspend MSCs in a fibrin matrix before injecting or "just shoot them into the joint," Frisbie said. Clinicians have not demonstrated significant long-term benefits to suspending cells in a matrix. With MSCs injected intra-articularly without matrix suspension, after 12 months, repair tissue was "firmer than when treated with hyaluronan alone." At six-month follow-up, 67% of horses with clinical osteoarthritis (OA) receiving MSCs had returned to work—double the number expected after traditional therapies.

At a 21-month follow-up, 73% of MSC-treated horses had returned to work; 35% had regained full function; and 38% had reduced function compared to original performance levels or needed continued treatment but were able to return to work.

Treatment success depends largely on case selection, he said. There seems to be evidence that MSCs don't work well in chronic, stable OA, but they seem to shorten the time required for horses to return to work following arthroscopic surgery.

—Dr. Christy Corp-Minamiji

Pastern Lucencies' Effect on Racing Performance

Prior to purchasing a yearling racing prospect at a sale, a buyer typically has a veterinarian conduct a thorough examination on the horse to ensure he is in top condition. Most of these exams include a review of radiographs, or X-rays, of the horse's limbs. Historically, many veterinarians have considered lucencies (bone cysts) in pastern radiographs benign; however, one researcher has determined certain lucencies—namely those located on midline—should be taken seriously because they appear to have a significant effect on racing performance.

At the 2011 AAEP convention Julie Vargas, DVM, described a retrospective study in which she and colleagues examined the impact of severe pastern lucencies in Thoroughbred yearlings on 2- and 3-year-old racing performance. Vargas, a practitioner with Equine Services LTD in Wellington, Fla., noted that prior to this study the association between the presence of these lucencies and racing performance had not been evaluated.

Vargas explained that pastern lucencies typically occur on the weight-bearing surface of the joint; vary in size, shape, and depth; and can be caused by a variety of factors, including developmental bone anomalies and/or trauma to the cartilage surface. Previous research indicates that they are detected more often in young male Thoroughbreds or in Warmbloods, and they're most commonly found in the forelimb, she added.

Colleagues at Rood & Riddle Equine Hospital examined 7,226 radiograph reports from Thoroughbred yearlings at auctions in the United States from 2002 to 2007. The team took measurements of the lucencies and noted each abnormality's location within the pastern. Maternal siblings were used as controls. In total, the researchers included 171 yearlings with lucencies in the study, along with 832 maternal siblings.

Upon reviewing the results of the review, Vargas found that:

■ Sixty percent of lucencies evaluated occurred in the hind limbs while 40% occurred in the forelimbs (a statistic contrary to previous reports of forelimbs being affected more often);

■ Thirty-nine percent of affected horses

were colts and 61% were fillies (refuting previous reports of males being more commonly affected);

■ Ten percent of the 171 affected yearlings had lucencies in two limbs;

■ There was no significant difference in the number of starts at 2 or 3 years, total earnings, or earnings per start between control horses and horses with lucencies located on the condyle (bulbous bottom or distal end of the bone) or facet (the smooth articular surface) of the pastern;

■ However, there was a significant difference between controls and horses with lucencies that occurred on the midline of the pastern; at 2 and 3, these horses had decreased earnings per start and decreased total earnings as compared to control horses. Additionally, starts at 2 were fewer than those of their sibling controls.

"It is also feasible that horses with large severe midline (pastern) lucencies race successfully," Vargas added, reminding that in general, "pastern cysts seldom cause lameness and so a direct relationship between midline cysts and decreased performance is unlikely. The reason for decreased performance with midline pastern cysts is unknown."

Vargas noted that midline lucencies are "often believed to be normal variations of synovial fossas (nonarticulating areas in synovial articular surfaces)" and, thus, aren't noted on all radiograph reports. Vargas' research indicates it could be beneficial to note these lucencies on radiographic reports more frequently.

"The ones that were noted (and, thus, the ones evaluated in the study) were therefore severe (i.e., seen on multiple radiographic views) in nature and evident on multiple radiographic views," she added.

"This is part of the ongoing research at the Rood & Riddle Equine Hospital to better define the significant radiographic findings seen on sale radiographs both at public auction and on purchase examinations," Vargas concluded. "Only when we research a radiographic finding like pastern lucencies do we know the implications of those findings on the expected performance of the horses we are evaluating."

—Erica Larson

Bute and Banamine: Avoid Using Together

A common approach to lameness in the equine athlete is non-steroidal anti-inflammatory medications (NSAIDs) treatments, such as phenylbutazone (PBZ, Bute) or flunixin meglumine (FM, Banamine) alone or sometimes in combination. At the 2011 AAEP convention, Jonathan Foreman, DVM, of the University of Illinois, discussed the effect of these medications on lameness when used at a normal recommended dose with these strategies and whether combining the drugs confers any special effects.

Reversible lameness was induced in eight Thoroughbred horses by using an adjustable heart bar shoe that could be tightened with a screw to elicit severe non-weight-bearing lameness. After an hour of the shoe application, Foreman and his colleagues treated the horses with one or both drugs: PBZ at 4.4 mg/kg, FM at 1.1 mg/kg, or PBZ + FM at these same dosages. In line with findings from previous studies, the team found that peak effect of these drugs occurred four hours following administration.

The team measured heart rates as an indicator of pain since, as explained by Foreman, heart rate is a primary variable that is elevated in lame horses following exercise workouts. All NSAID treatments decreased heart rates for two to 10 hours after administration, while lameness scores decreased for 1.3-12 hours. Heart rate reduction indicative of pain relief lasted for 12 hours after giving FM alone and the combination of PBZ plus FM. Lameness scores decreased more quickly for PBZ or PBZ + FM combo-treated horses than for FM. Foreman concluded, "No significant differences were noted between giving PBZ alone or combining FM with PBZ."

One of the biggest concerns he mentioned is the increased risk of gastrointestinal and renal toxicity as a result of administering PBZ and FM combined. He commented, "Recent work from another laboratory showed that combining half-dose oral PBZ with full-dose intravenous FM for only five days resulted in frequent ulcers and decreased plasma total proteins, indicative of gastrointestinal ulceration." In this current study, Foreman showed that there is no benefit in effect from combining the two drugs, and he speculated that there is very likely to be increased toxicity if that combination is given over several days time.

Foreman stressed, "Giving twice the normal dose may not cause the analgesic effect to persist up to 24 hours, while this higher dose is toxic to kidneys and an already stressed gastrointestinal tract." Since he found that combining NSAIDs achieved no better results than using either drug alone, Foreman stressed that there is no good reason to combine these NSAIDs.

—Dr. Nancy Loving

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