

Feeding for Joint Health

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Performance Horse Nutrition

Athletic competition often requires horses to run, jump, turn, start and stop, placing an enormous strain on the skeletal system. As such, a performance horse may fail to reach its athletic potential because of injuries and diseases of joints, which are the most common causes of lameness. As joint problems can be a limiting factor in career longevity of athletic horses, care and maintenance of joints are a major concern among horsemen.

The Equine Joint

A joint is the union of two bones, regardless of the location in the body. A joint allows controlled movement of bones relative to each other, thus allowing the skeleton to move. Joints found in the leg of a horse endure incredible pressure during movement.

In a healthy joint, the ends of the bones are coated with a thin layer of articular cartilage reducing friction. Bones are also surrounded by a joint capsule with a tough outer layer (to connect the bones and protect the joint) and a permeable inner layer or synovial membrane. The membrane secretes synovial fluid, a slippery, viscous liquid, providing essential lubrication and allows the passage of nutrients and other elements from the bloodstream.

Synovial fluid is nutrient-rich containing proteins, enzymes, water, leukocytes and a key ingredient; sodium hyaluronate, which is responsible for the fluid's elastoviscous qualities. Sodium hyaluronate (formerly known as hyaluronic acid) is a negatively-charged sugar chain or glycosaminoglycan (GAG), which arranges itself in complicated coils, adapting to the pressure changes in the joint capsule as the horse moves. It assures the unhindered passage of metabolites to and from tissues throughout the joint and also serves as a stabilizer and shock absorber for the structures that are undergoing continual, changing mechanical stresses.

Articular cartilage, the other main shock-absorbing component of a joint, is an efficient but flawed structure. Its structural framework is a web of collagen fibers with cells called chondrocytes scattered along the matrix. Chondrocytes produce giant proteoglycan molecules that bind the GAGs. The GAGs in turn extract and loosely hold large amounts of positively-charged water molecules. When cartilage is damaged, there is a decrease in the number of GAGs; therefore, the cartilage holds less water. Cartilage conforms to the bone surfaces for a tight fit between weight-bearing bones, it spreads pressure evenly over a broad area and manages the water in its matrix, squeezing it out when the joint is under pressure and drawing it back in when the joint is not under pressure. This in-and-out movement of the fluid transports nutrients throughout the cartilage. However, there is a downside to cartilage as it has no blood or nerve supply of its own, so cartilage has little or no ability to heal or repair itself. Although cartilage performs admirably under normal conditions

Joint Damage

Lameness, change in the normal range of motion of a joint, can result from damage to any of the tissues associated with the joint, such as:

- Disrupted ligaments, tendons, or muscles due to injury.
- Disease of the supporting bone can lead to collapse of the joint surface.
- Damage to the articular cartilage, such as the breakdown of collagen and loss of proteoglycan resulting in weakened cartilage, which loses its smooth articulating surface.
- Damage to the synovial membrane and changes in the makeup of the joint fluid result in alternations in normal joint viscosity.

So what is the underlying reason for joint damage? The answer is quite simple – inflammation.

Inflammation is normally a protective mechanism initiated by the body in response to injury in an attempt to repair the injured tissue. Inflammation causes blood vessels to dilate and allows fluid and cells to leak out. However, the inflammation response in a joint is a process designed to break down and remove injured or foreign material. This process changes the chemical makeup of the fluid in the joint, introducing excess fluids and a high concentration of destructive enzymes and prostaglandins into a closed area (the joint capsule). This destroys the lubricating GAGs and the synovial fluid begins to lose viscosity. The articular cartilage eventually suffers from a compromised nutrient supply and cannot keep up with repairs and develops damaged areas, opening the bone ends to direct trauma. The bone responds with a defense that only causes further destruction; it lays down new bone to strengthen the surface (sclerosis) and extends its margins in the form of bone spurs. If left unchecked, this inflammation, known as arthritis, will totally destroy the joint.

Treatment Strategies

Many options exist for treating joint disease in horses. The major treatment goals are to reduce inflammation, to improve joint fluid and to improve cartilage. Treatments to accomplish these goals generally fall into two categories: physical therapies and nutritional therapies.

Physical therapies include rest, bandaging, application of heat, application of cold, and mild, controlled exercise to maintain range of motion.

Nutritional treatment options for horses with joint disease attempt to stop or decrease inflammation and replace some of the natural constituents of joint fluid and/or cartilage, with the goal that the body could use those building blocks to restore normal joint function. Traditionally, equine veterinarians may inject corticosteroids directly into the joint capsule. Corticosteroids are potent anti-inflammatories, but they are thought to potentially harm or damage joint cartilage if used improperly. Veterinarians have also traditionally injected hyaluronic acid (HA) directly into the joint capsule. HA is part of normal joint fluid and it is recognized as a mild anti-inflammatory. HA has been coined as “chondroprotective”.

Oral treatment options for horses with joint disease run the gamut with ingredients and ingredient combinations. Research studies have demonstrated that oral HA is absorbed from the digestive tract,

and it has a serum enhancing effect on circulating HA levels. Horse owners indicate many horses seem to improve their lameness score when provided oral HA.

Another common ingredient in joint supplements is Glucosamine due to its main action of stimulating the manufacture of substances necessary for joint synthesis. Researchers have found that glucosamine is the key precursor for all the various sugars found in GAGs and further, that glucosamine occupies the pivotal position in connective tissue synthesis by stimulating collagen production.

Glucosamine HCl has the advantage of being more absorbable than other GAGs products currently available.

In addition to chondroitin sulfate and glucosamine, other ingredients necessary for synthesis of joint tissues are included in oral joint supplements, such as MSM (methylsulfonylmethane), copper, zinc, manganese and vitamin C. MSM is a source of sulfur, a component that is necessary to strengthen collagen. The trace minerals copper, zinc and manganese are each involved as cofactors for synthetic production of joint materials. Finally, vitamin C is necessary for collagen formation.

Omega 3 fatty acids, in particular docosahexaenoic acid (DHA) has also been shown to have positive results in alleviating inflammation.

dac® Vitamins and Minerals has a variety of joint and inflammation associated discomfort mediating supplements available:

Optimum Flex Plus	Blend of Chondroitin, Glucosamine, HA MSM and vitamin C to support joint health and alleviate inflammation
HY-Victory	Oral HA to increase joint synovial fluid
DHA Perform	Rich in the Omega 3 fatty acid DHA which has been shown to alleviate inflammation
Yucca 5-Way PAC	Has elevated concentrations of copper manganese and zinc as well as yucca schidigera extract which may help in reducing inflammation.
Herbal Respond	Concentrated levels of yucca schidigera extract along with Devils Claw which have anti-inflammatory properties. Elevated levels of vitamin C.

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