

Orthopedic Disorders in Companion Animals Benefits from Oral Dietary Glycoaminoglycans?

by

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It is not uncommon for a person with a dog or a horse to encounter an orthopedic problem. Most orthopedic problems with companion animals are noticed in the legs, hips or back. Some orthopedic problems can be mild, causing only a slight discomfort while others so severe that the animal cannot walk. Consequently, the variety of forms and signs that are indicative of an orthopedic disorder make it difficult to determine the source of the problem.

An orthopedic problem is generally multifactorial in nature, meaning that it is affected by a number of things. The type and severity of the disorder can vary. A combination of genetics, environmental and nutritional factors usually play a role in these types of problems. The degree to which each of these factors influences a given disorder affects the type and severity of the problem. Certain breeding practices can permit animals to become more genetically predisposed to acquiring orthopedic problems. For example: Wobblers disease is strongly affected by genetics with no apparent influences due to nutrition. On the other hand, canine hip dysplasia is only moderately inheritable, consequently, dogs genetically predisposed to exhibiting hip dysplasia must have an environmental or nutritional influence on the dog for those genes to be phenotypically expressed. A bred pair of dogs may genetically have the genes responsible for hip dysplasia but not showing it. A breeder would feel confident that puppies from this pair would not have hip dysplasia. However, the puppies can develop problems associated with hip dysplasia if given food or an environment that is different from the parents that augment the expression of those bad genes.

Only under extreme nutrient imbalances can nutrition alone cause an acute orthopedic problem. Long periods of less than extreme imbalances of nutrients may cause problems when combined with genetics and environmental factors. Excessive amounts of dietary calcium has been shown to cause problems in bone growth. It is believed that animals growing too fast have orthopedic problems because of a less than optimum weight to size ratio. Reduction in energy intake has been shown to alleviate potential problems due to rapid growth. It is believed that rapid growth under unfavorable environmental conditions will cause problems for animals that are genetically predisposed to having orthopedic disorders. An example may be a rapidly growing foal genetically predisposed to leg problems under a hard training regime. High dietary protein has never been shown to contribute to orthopedic problems provided that the dietary amino acid profile is balanced and the animal has access to a good supply of drinking water.

The Role of Glucosamine Sulfate and Chondroitin Sulfate

The joints of an animal are an area of activity and motion. The joint must be strong, cushioned and lubricated to properly perform. Cartilage is one of the tissues that contribute to the function of a joint. Cartilage is made of cells and matrix. Nutrients diffuse into the cartilage matrix because it is somewhat devoid of blood vessels. The matrix is essential to lubricating and cushioning the joint. The matrix is primarily comprised of collagen and glycoaminoglycans (GAG). The GAG give the matrix flexibility and strength. GAG are comprised of several compounds but chondroitin sulfate is the most abundant. Glucosamine is a precursor to chondroitin sulfate.

Are Dietary GAG Beneficial?

It is thought that feeding either chondroitin sulfate or glucosamine sulfate can help an animal rebuild cartilage. Can feeding GAG alleviate orthopedic problems associated with arthritis, trauma or disease? Research from some studies indicates improvement in orthopedic problems due to feeding GAG. However, there are a number of studies in humans and animals that show no benefits. Perhaps it may be feeding GAG is just too simple a solution to solve a complex problem. The multifactorial origin of most orthopedic problems makes it difficult to identify the major culprit. Perhaps dietary GAG do more than act as a precursor to cartilage. They may turn on or shut off genes or act upon the immune or endocrine systems. GAG may reduce the extent of inflammation and allow for cartilage to rebuild. Thus, the conclusions drawn have suggested that feeding GAG may result in an improvement for some orthopedic problems but is not the answer to all disorders. Animals that do not respond favorably to dietary GAG may need veterinary assistance and administration of anti-inflammation drugs.

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