

The Science Behind Nutritional Supplements

BY DR. STACEY OKE / ANNE M. EBERHARDT PHOTOS

Market survey reports indicate half of all horse owners feed some form of nutritional supplement to their horses, and many even offer two or more nutritional supplements per day. With products on the market touted to treat virtually every ailment under the sun, from metabolic and joint issues to insect control and behavior problems, surely they work...and my brother's friend's cousin's horse proves it!

The truth is, nutritional supplements might very well be valuable additions to your horse's diet; however, there are two main challenges with using these products. First, a lack of scientific evidence exists to support many supplements' use, even after decades of promotion; and second, poor-quality supplements are widely available that do not actually contain the ingredients they claim. Together, these two issues make it difficult to know what product/ingredient really is or is not working.

This article examines some of the most popular nutritional supplements, their primary ingredients, and what science says about them. It also discusses the importance of avoiding oversupplementation.



MEGAN ARSZMAN



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Types of Supplements

A recent market survey of veterinary nutraceuticals reports that the five most popular classes of equine nutritional supplements are those targeting joints, digestion, hoof care, skin/coat health, and relaxation. The list of "other" supplements is extensive, including products for insect control, anhidrosis (the inability to sweat), mare-specific issues, metabolic concerns, muscles, tendons, ligaments, respiratory conditions, allergies, and the immune system, among others.

Some manufacturers produce nutritional supplements containing one or a few "key" ingredients targeted to a specific problem.

For example, supplements aiming to solve hoof problems include the key ingredients biotin, methionine, and zinc. Thus, some products are available with just these three ingredients. Other manufacturers embrace a "the more, the merrier" attitude and produce hoof supplements that contain not only biotin, methionine, and zinc, but also a variety of herbs, minerals, vitamins, amino acids, carbohydrates, etc.

Common and uncommon ingredients included in the five most popular types of equine nutritional supplements are as follows:

Joint Supplements

It is not surprising that joint supplements are by far the most popular, considering that lameness and osteoarthritis are two of the most common equine ailments. While some are made well, and some studies on oral joint health supplement (OJHS) efficacy have yielded favorable results, an abundance of poor-quality products abound, according to a presentation given at the 2008 American Association of Equine Practitioners convention by Dr. C. Wayne McIlwraith, Barbara Cox Anthony University Chair and Director of Orthopaedic Research at Colorado State University. Typical joint supplement ingredients are glucosamine (hydrochloride, sulfate, or N-acetyl-D-glucosamine), chondroitin sulfate, and methylsulfonylmethane (MSM). Other products can include hyaluronic acid, cetylated fatty acids, Perna mussel, collagen/gelatin, avocado-soybean unsaponifiables (ASU), vitamin C, herbs (yucca, Devil's claw, Boswellia), and other "unique" or patented ingredients.

Dr. Wendy Pearson, a graduate student at the University of Guelph's Department of Plant Agriculture in Ontario, Canada, recently addressed the need for additional research on glucosamine-based nutraceuticals, in particular.

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"We critically evaluated 15 studies on glucosamine-based equine nutritional supplements and found only three of these

were 'quality' studies based on how well the studies were designed, the data collected and analyzed, and how the results

were reported," she said.

Pearson and colleague Dr. Michael Lindinger, from the University of Guelph's Department of Human Health and Nutritional Sciences, concluded, "The publication of poor-quality studies prohibits meaningful interpretation of the results. New, high-quality studies are needed for glucosamine-based and other nutritional supplements."

Digestion

There are two main groups of products included in this category: those with pro- and prebiotics designed to help keep the digestive system stabilized; and those designed to prevent or resolve gastric (stomach) ulcers. First, pro- and prebiotics are marketed to promote a healthy gastrointestinal (GI) system, which might ultimately help reduce the horse's chances of developing gas, colic, diarrhea, and laminitis, along with possibly improving his feed efficiency and immune system health. Probiotics are a source of "good" microorganisms that take up residence in the large intestine to help digest feed. In contrast, prebiotics are nondigestible products that essentially feed these good microorganisms in the horse's hindgut. Examples of probiotics are *Lactobacillus* spp, *Bifidobacterium* spp, and *Saccharomyces boulardii*. Examples of prebiotics are fructooligosaccharides (FOS), xylooligosaccharides (XOS), and mannoooligosaccharides (MOS).

Some digestive health nutritional supplements also include digestive enzymes, hindgut acid protectors, licorice, glutamine, and various other compounds as approaches to combating inflammation and ulcers.

Studies assessing the use of pro- and prebiotics are important, considering how sensitive the equine hindgut is, particularly to sudden changes in feed. Research indicates that prebiotics such as FOS might be able to reduce microbial population disruptions in the equine hindgut in cases of acute starch overload



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(i.e., if a horse gets into a grain bin). In 2005 veterinary researchers from the University of Pennsylvania's New Bolton Center reported that oral administration of the yeast *S. boulardii* could be used to help decrease both the severity and duration of acute enterocolitis (inflammation of the small intestine and colon).

Unlike supplements for digestive health, products marketed for gastric ulcer prevention have an interesting variety of ingredients. Some products contain antacids (e.g., magnesium and/or aluminum hydroxide) and/or soluble fiber, whereas others rely on licorice and/or other herbs as their key ingredients. Many ulcer products also contain pro- and prebiotics as well as the amino acids L-glutamine and L-threonine, which might help the cells lining the stomach heal after injury.

Research results published in veterinary literature indicate antacids increase gastric pH (i.e., make it less acidic and, therefore, less likely for ulcers to form), but only for a limited period of time. Experts generally agree that feeding antacids to horses in high enough amounts and frequently enough to facilitate ulcer healing is challenging.

For example, the chapter on gastric ulcers in *Current Therapy in Equine Medicine*, sixth edition by Dr. N. Edward Robinson and Dr. Kim A. Sprayberry, recommends administering 200-250 mL of an aluminum-magnesium hydroxide antacid every three to six hours to help increase gastric pH, but the authors note this is not likely to contribute to healing existing ulcers. Supplementation might not even be necessary in many cases, as an alfalfa hay and grain diet alone has been shown to buffer stomach acid in horses.

As an alternative to antacids, some products include licorice as the key ingredient. Licorice is an herb used frequently in a wide variety of nutritional supplements purportedly possessing anti-inflammatory and anti-ulcer effects (among others). No studies on licorice's effect on gastric ulcers (or other ailments) in horses appear to have been published in peer-reviewed journals; however, one study on gastric ulcers in rats published in March 2010 stated, "These results supported the ethnomedical use of licorice in the treatment of gastric ulcers." Such results might not apply to horses.

Hoof Care

In addition to biotin, methionone, and zinc, some hoof supplements also include inositol, choline, a variety of amino acids (e.g., lysine, cystine, glycine, proline, tyrosine, phenylalanine), minerals (copper, cobalt), and various other ingredients including MSM, omega-3 and -6 fatty acids, gelatin/collagen, silica, electrolytes (cal-

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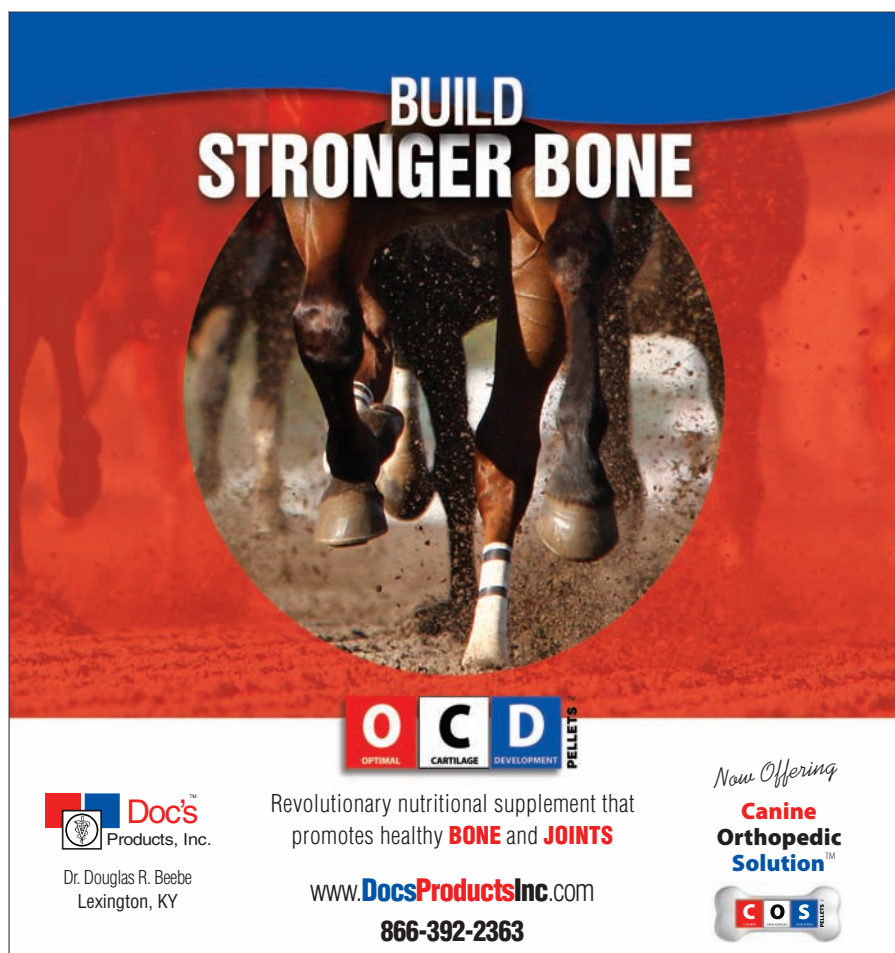
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cium, phosphorus, sodium), and vitamin C (ascorbic acid). The majority of these ingredients have not been studied to determine their effects on hoof growth. But some studies on biotin alone suggest supplementing with 15-60 mg of biotin per day for at least five to 10 months improved hoof growth rates and hardness.

In 1990 Dr. Susan Kempson, senior lecturer in Preclinical Veterinary Sciences in the University of Edinburgh's Royal (Dick) School of Veterinary Studies, studied the effect of one biotin-containing hoof supplement in 18 horses with various hoof abnormalities (among them were cracks, crumbling horn, bruising, and col-



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lapsed heels). After only six weeks of supplementation, both grossly visible and microscopic improvements were visible in the horse's hooves, and these improvements persisted for the entire two-year study period. Several other studies have reached similar conclusions since.

Skin and Coat Health

Do you want your horse to have a silky, shiny coat and a lustrous mane and tail? Of course you do, which is why this type of nutritional supplement is so popular. The primary ingredient in these products is fat.

"If your sole goal is to obtain a shiny, supple coat, you need not feed the more expensive omega-3 fats—if you could get your horse to eat lard, that would do the job just as effectively," said Dr. Sheryl S. King, professor in the Department of Animal Science, Food, and Nutrition at Southern Illinois University at Carbondale. "I do believe feeding higher levels of omega-3 fatty acids in horses has health benefits. We have documented a few already in controlling inflammation, in improving some indicators of athletic stress, and in some aspects of reproduction."

Read the label carefully, though, because not all "omega fatty acid supplements" contain higher levels of omega-3 fatty acids than omega-6 fatty acids, which they should if you feed a fat supplement for its anti-inflammatory properties. Further, the "cream of the crop" omega fatty acids are eicosapentaenoic acid (EPA) and do-



Consider the proper balance when adding supplements to a horse's diet

cosaheptaenoic acid (DHA), which come from fish oil. Only a few supplements contain these pearls and are generally more expensive.

Calming Effects

More so than a hot bubble bath, products to help horses relax and focus on their work are extremely popular. The primary ingredients in these products are B vitamins (thiamine), magnesium, L-tryptophan, and the herbs valerian and chamomile. Proponents say valerian has sedative qualities, relaxing the central nervous system. Chamomile has a reputation for its apparent soothing and relaxing effects. Tryptophan is the amino acid precursor for serotonin, a neurotransmitter implicated in sedation, inhibition of aggression, fear, and stress.

In 2004 two researchers reviewed the use of L-tryptophan as a calmative, determining that while there's evidence it has calming effects, its efficacy is questionable. In an editorial published in 2005 by Dr. Pat Harris, from the Waltham Centre for Pet Nutrition in the United Kingdom, little information about L-tryptophan in horses was available. Harris noted that other calmatives such as chamomile and valerian also have not been studied in the horse, so their use is based loosely on work done in other species showing/suggesting positive effects.

Veterinarians urge owners and trainers to be cautious about using these products in competition horses, particularly if those horses might undergo drug testing. Some regulating bodies do not permit the use of valerian and other herbal calmatives. Further, these products might not be safe if used incorrectly; IV thiamine, for instance, has caused anaphylactic shock in horses when not administered properly.

Balancing your Horse's Daily Ration

It is imperative to consider all of the macro- and micronutrients in your horse's daily ration. While most of these products are safe when fed orally, oversupplementing vitamins, minerals, or other nutrients can be detrimental to your horse's health—not to mention your wallet.

Consider a horse that is supplemented with a joint supplement, multivitamin, and a skin/coat supplement. Many ingredients are duplicated or even triplicated. Thus, your horse could be receiving several times more of each of these vitamins and minerals than is recommended or is safe. Young horses fed high levels of zinc, for instance, have developed lameness and stiffness.

"This is believed to be not so much a result of the zinc, but of the relationship between zinc and copper," explains Karen Waite, a Michigan State University Extension equine specialist. "Copper is required for normal cartilage development, and young horses with zinc toxicosis have a secondary copper deficiency which impacts the growth of their bones."

Take-Home Message

In her guest editorial in the July 2005 edition of *The Veterinary Journal*, Harris wrote, "As we improve our understanding of the value of nutrients, rather than medicines, in the management and care of our horses, there will, I believe, be an increasing role for supplements—but hopefully only for those that have some real support for their use in the horse."

Since Harris' editorial was published, the nutritional supplement industry has exploded and owners and trainers have embraced the concept of "treating" horses through diet rather than

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with drugs. Unfortunately, the majority of nutritional supplements continue to be produced, purchased, and administered without any support for their use, with few notable exceptions. Veterinarians, owners, and trainers are therefore encouraged to choose and administer supplements manufactured by companies committed to research and proving the quality, safety, and efficacy of their nutritional supplements.

Most nutritional supplements are regard-

ed as safe, but several textbooks have been devoted to the topic of herb-nutrient-drug interactions. Some nutrient supplements, particularly those containing herbs, might not be safe when given in conjunction with drugs or pharmaceutical products. Be sure your veterinarian knows exactly what supplement(s) and how much of them you are administering to your horse.

Above all, work with your veterinarian and an equine nutritionist to determine

your horse's dietary requirements and address any additional supplements he might require. 

Excerpted from *The Horse: Your Guide to Equine Health Care*. Free weekly newsletters at www.TheHorse.com

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