Regulations and Efficacies of Some Common Equine Supplements

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Hundreds of equine supplements are on the market today. Some supplements have nutritional benefits, while others have medicinal (veterinary) effects. The intended use and the government’s classification of the ingredients determine how, or even if, the supplement is regulated. These regulations are put in place to protect the horse and horse owner.

When considering a supplement, regardless of its intended effect, the horse owner must educate him/herself. Among other things, the horse owner should consider the necessity of the supplement. Horse owners have the responsibility to research the possible benefits or drawbacks of a supplement. Consult with nutritionists and/or veterinarians before purchasing a supplement. These individuals should be able to provide advice on what to look for in a supplement and what to avoid, as well as provide information about possible medicinal or nutritional interactions.

The following discussion includes only a few of the many supplements available for horses.

Who regulates supplements?
Supplements are regulated on both the federal and state level. On the federal level, the United States Food and Drug Administration (FDA)’s goal is to ensure the safety of American’s food supply and the safety and effectiveness of medical products available to the public. Within the FDA, the Center for Veterinary Medicine (CVM) is responsible for the regulation of animal drugs, medicated feeds, and animal food additives. Animal feeds do not require FDA approval before being sold provided that the ingredients are either approved food additives or the ingredients are generally recognized as safe for their intended use. Each state, usually through the state’s Department of Agriculture, also has specific regulations for feed manufacturing and labeling.

Two other entities work with the federal and state governments in helping develop regulations and legislation for animal feeds and supplements. The first is the Association of American Feed Control Officials (AAFCO), which is made up of officials from all 50 states, Puerto Rico, Costa Rica, Canada, and the federal government, including the FDA. AAFCO works on the state level by having a uniform code which “serves as the standard on which the states base their feed laws and regulations in order to maintain a substantial degree of uniformity throughout the United States” (aafco.com). It is each state’s discretion as to which AAFCO recommendations they use. For this reason, manufacturing and labeling laws can vary from state to state.

The second group is the National Animal Supplement Council (NASC), which was formed in 2001. It is an industry group made up of supplement manufacturers in an attempt to self-regulate. NASC attempts to work with state and federal agencies to standardize and regulate supplements. NASC offers an approval system to supplement manufactures that complete an audit and demonstrate compliance with their guidelines.

Medicinal (veterinary) supplements
The FDA defines a drug as “any substance, food or non-food, that is used to treat, cure, mitigate, or prevent a disease. A drug is also any non-food substance that is intended to affect the structure or function of the animal. Drugs must be shown to be safe and effective for their intended use” (FDA Newsletter. 1996, volume XXI, IV).
The intended use distinguishes drugs from nutritional supplements. For instance, if a vitamin E supplement is marketed to meet the horse’s nutritional requirement, then it is a nutritional supplement. Vitamin E is approved and generally considered safe when used in this manner. If, however, vitamin E is marketed to treat or prevent tying-up, then it is a drug. As a drug, vitamin E is not approved for this use and could not be marketed. Such claims could not be on the label.

Because medicinal supplements are generally intended to treat a disease or affect the animal’s function, they are considered drugs and fall under the control of the FDA’s Center for Veterinary Medicine (CVM). Most laws and regulations target veterinary controlled drugs (e.g., antibiotics, vaccines, etc.). Such medications are closely monitored and strictly regulated. Most of medicinal supplements available in animal supply stores are considered “low regulatory drugs”, meaning that regulation for these products is essentially non-existent. In turn, this means there is very little to no consumer protection with these products. As with any medication, a veterinarian should be consulted before a medicinal supplement is given to a horse. Medicinal supplements could interact with each other or with other veterinary-prescribed medications.

Chondroitin Sulfates/Glucosamines/Hyaluronic Acid
Much of the early research involved intra-articular (into the joint) injections of hyaluronic acid, glucosamines and/or chondroitin sulfates (glycosaminoglycans). These injections are still the preferred method of treatment for horses in which a veterinarian has diagnosed arthritis and other joint problems.

Oral supplements are available for horses with apparent joint problems. Though results have not been consistent, research in humans and domestic animals, including horses, has shown oral administration of hyaluronic acid, glucosamines, and chondroitin sulfates can significantly relieve arthritis symptoms. These supplements appear to stimulate joint cartilage growth and reduce cartilage degradation. Other studies have reported increased synthesis of hyaluronan, a component of synovial fluid (joint lubricant). Although the research to date has not provided an "optimal level", the effects of glucosamines and chondroitin sulfates appear best when used in conjunction with each other along with manganese ascorbate.

MSM (methyl-sulfonylmethane)
Another popular supplement often used to relieve joint pain as well as other maladies in the horse is methyl-sulfonylmethane (MSM). MSM is a derivative of dimethylsulfoxide (DMSO), a topical anti-inflammatory agent. Because MSM products are marketed as nutritional supplements (as a source of dietary sulfur), they are not FDA regulated; therefore, manufacturers of such products cannot legally make therapeutic claims. Nevertheless, many horse owners and veterinarians using MSM products claim they aid in reducing physisis and relieving joint pain and swelling associated with arthritis. Additional claims have been made for relief from allergic reactions, heaves, and other respiratory ailments. The efficacy of this supplement has not been demonstrated, but anecdotal evidence in the field appears favorable in some cases.

Nutritional supplements
As stated earlier, animal feeds do not require FDA approval before being sold as long as the ingredients are either approved food additives or the ingredients are generally recognized as safe for their intended use. AAFCO makes recommendations to state regulatory agencies regarding manufacturing and labeling laws. State agencies are not required to take AAFCO’s recommendations. As a result, each state has a different set of regulations for allowable ingredients, labeling, and marketing. Some states are stricter in their regulations than others. Some states will prohibit the sale of supplements containing ingredients that are not approved or allowed, while other states would allow the sale of the same supplement.

Vitamin E/Selenium
Vitamin E and selenium are two of the most well-known antioxidant nutrients in equine nutrition. Research has shown antioxidants may help boost the immune response and aid in preventing muscle soreness and cellular damage during and after exercise. The minimum requirements and toxic levels of both have been established through extensive research with horses. Vitamin E is well tolerated and toxicity is rare. Research has shown horses tolerated vitamin E levels of 10,000 IU per day. Selenium toxicity, on the other hand, can easily occur. Selenium levels of 50 mg per day would be toxic to horses.

Selenium concentrations in most forages and grains are deficient, but some areas of the United States are high in selenium. While there are some exceptions, high selenium soils are usually found in the western half of the United States. Forages grown in high selenium soil, whether it be fresh pasture or hay, may contain high levels of...
selenium. Additionally, most feed manufacturers fortify feed with selenium. Horse owners should consider the selenium levels in their soils, forages, and feeds when deciding if a supplement is necessary.

In general, vitamin E supplements should provide 1000 IU per day and selenium supplements 1 mg day. These nutrients should be supplemented only when the diet is deficient or there is a therapeutic need (diagnosed by a veterinarian).

Vitamin C

Another familiar antioxidant is vitamin C (ascorbic acid). Healthy horses produce sufficient vitamin C for their own use; therefore, it is not required in the diet. Some horse owners and veterinarians have used vitamin C to improve racing performance and reproduction function; however, no confirmed data exists to support these applications. Vitamin C supplements should contain a minimum of 4.5 g up to 20 g per day, as these levels have been shown to increase plasma ascorbic acid levels.

Biotin/Methionine/Zinc

Some of the most familiar and widely used nutritional supplements on the market today are hoof supplements. The key to using any hoof supplement is patience. Results will only appear in new hoof growth; thus, visible improvement may take 3 months or longer. Most horse owners concerned with hoof quality are familiar with the B-vitamin, biotin. A few clinical trials and controlled studies have shown biotin improves hoof horn quality after several months of oral supplementation. Biotin is generally not well absorbed in the digestive tract; therefore many hoof supplements contain yeast culture to aid in biotin absorption. At least 15 mg of biotin per day (per 1000 pound horse) along with a yeast culture is recommended in a hoof supplement. Research has shown that feeding higher amounts does not appear to provide additional benefits.

Using biotin alone may produce satisfactory improvements in the horse’s hoof; however, more significant improvement may occur if all the necessary building blocks are present. While adequate dietary protein is essential in a horse’s diet, methionine is the dietary amino acid that plays the most important role in the development and structural integrity of hoof tissue. No specific requirement of methionine has been established for the horse. Consumers should consider that horses normally consume thousands of milligrams of methionine daily from forages and grains; thus, supplements should provide several thousand milligrams of methionine per day.

Another key element in hoof horn tissue is zinc. The highest trace element concentration in hoof is zinc. In other species, some of the first clinical signs of zinc deficiency are hoof and hair coat problems. Most grains and forages grown in the United States do not meet zinc requirements for horses. As a result, most feed manufacturers fortify feeds with zinc. Caution should be taken to ensure that the supplemental zinc level is not so high that in combination with forage and grain, the nutritional balance of the entire diet is upset (e.g., too much dietary zinc could create a secondary copper deficiency). To be nutritionally significant, a hoof supplement should contain at least 70 mg per dose, but no more than 200 mg per day.

Iron

Supplements containing high levels of iron are also popular among horse owners. Normal, healthy horses consuming grains and forages grown in the United States do not need additional iron in the diet. To date, no published research has shown anemia in horses primarily resulting from an iron deficiency. A heavy parasite infestation may cause slight hemorrhaging and blood loss, resulting in anemia. Anemia also may be caused by deficient dietary B-vitamins or copper rather than an iron deficiency. In these cases, parasite management or other nutritional supplementation would help to alleviate the problem.

Excess iron consumption may bind other minerals (calcium, copper, manganese, zinc) and result in secondary mineral deficiencies (even though the other minerals are being provided in adequate amounts). Additionally, because it is an oxidant, excess iron may use antioxidants (vitamin A, C, E) more rapidly, thereby increasing the requirement for these nutrients. In general, supplementing iron to healthy horses has not been proven beneficial.

The Gray Area

For lack of a better term, some supplements fall into a gray area of regulation. AAFCO does not recognize some supplements as nutritional, while the FDA does not recognize them as drugs. The result is a group of products with very little to no regulation; therefore, there is very little in the way of consumer protection when purchasing these products. NASC is working with federal and state agencies to provide better regulation of these products.
**Herbal Aids**

Herbs have become popular additives to equine diets. Even though many herbal supplements have medicinal effects, the FDA does not recognize most herbs as drugs (for humans or horses).

Considerable Chinese research has demonstrated the uses of herbs on humans. Many herbal aid manufacturers and horse owners have applied positive human results to horses, even though no effects on horses have been published in respected journals. This is not to say that some herbal remedies do not work, but only that their effects on horses have not been well documented thus far. The proposed effects of herbs should be considered medicinal rather than nutritional, and a veterinarian experienced in herbal treatments should be consulted. Due to the lack of Western research in this field, consideration should always be given to possible interactions between herbs and other traditional Western medicines and nutrients in the equine diet.

**Probiotics/Prebiotics**

Probiotics and prebiotics are prevalent additives in equine diets today. Probiotics are live microbes (e.g., cultures of yeast, bacteria or fungi). When probiotics are fed, the by-products (metabolites) of the probiotic cultures act to promote a healthy environment for favorable microbes to thrive in the digestive tract of the horse. The definition of prebiotics is not so clear cut. The clearest characterization of prebiotics is that they are not live microbes. Prebiotics can include metabolites of live microbes or parts of the live microbes (e.g., yeast cell wall) or other ingredients that promote the growth of ‘beneficial’ microbes in the horse’s digestive tract (e.g., short chain sugars that ‘feed’ beneficial digestive tract microbes).

Probiotics and prebiotics fall into the gray area of regulation. The intended use is the key. Yeast culture, for instance, is an approved feed ingredient; therefore it is regulated by AAFCO for this use only. Yeast culture, however, cannot be legally marketed for medicinal purposes (e.g., improves digestion), as it is not approved for use as a drug.

Both probiotic and prebiotic products are claimed to improve performance. Improvements in performance can range from improved body condition to improved reproduction to providing a competitive edge at the racetrack. Research is limited on the effects on racing performance, with conflicting results to possible benefits. Both probiotics and prebiotics appear to be most useful in cases where the digestive tract is compromised, such as after surgery, in cases of laminitis or colic, or when prolonged broad-spectrum antibiotics are administered. Prebiotics may work synergistically with probiotics to improve the microbial environment of the digestive tract. For effectiveness, a probiotic supplement should provide billions of microbes per daily dose.

**Summary**

Consumers have a wide variety of choices among equine supplements. Supplement ingredients should be thoroughly researched before a purchase is made. The most important consideration should be the true necessity of the supplement. Providing specific information on your horse's diet to a sales representative, an equine nutritionist, or a veterinarian will help in making that decision. If the supplement has a medicinal effect (e.g., joint supplements, herbs), then consult with a veterinarian before beginning supplementation. Likewise, consult with a nutritionist before adding a nutritional supplement to avoid nutrient imbalances and interactions in the diet. Always compare recommended daily dosage of supplements with the concentrations provided in guaranteed analysis. Make any necessary mathematical conversions to determine the actual amount of nutrient provided. The responsibility falls to the horse owner to determine if the supplement is providing nutritionally or medicinally significant levels of the target component.