

## When Should You Supplement?

by: Karen Briggs

February 01 1999 Article # 279

Look around any barn and you'll see the evidence. Do you know a feed room that doesn't have a collection of jugs and buckets, pails and little plastic scoops, pellets and powders in a rainbow of colors? The ingredients range from high-tech chemical formulas, to "all natural" mixtures of herbs. And their presence next to the bags of grain and bales of hay says that we don't believe that our feed programs are delivering all the nutrition our horses need.

What motivates us to go out and buy supplements to add to our horse's diets? Usually, it's an honest desire to make sure that our equine companions are taking in the best nutrition available. But while the motivation might be noble, many of us decide to feed a supplement based more on a "gut feeling," or a recommendation from a friend, than on an actual analysis of what our feed program supplies, and what might be lacking in it.

Frequently, we have an incomplete understanding of the supplements we feed and what they are supposed to accomplish. Exactly what vitamins and/or minerals--or other compounds--are included in the mix? What are they proven (or reputed) to do for your horse? Are they safe and appropriate additions to the ration? In what concentrations are they included, and how do they combine with the nutrients already supplied by your grain and hay? It can add up to a lot of questions.

To help you decide whether you really need to feed a supplement to your horse, let's consider some of the issues first.

### To Supplement, Or...

Long before you purchase a supplement, you need to evaluate your feed program and determine why you are considering supplementing. Do you feel that the grain or hay quality is poor? Is your horse just not looking 100%? Or is there a specific need you'd like to fill--for example, you'd like him to develop a shinier coat, effect better hoof growth, or have more energy? Be honest...is it because a friend is feeding Supplement X and says she's getting great results? Such a recommendation might have merit, but what works for one horse and one situation might not apply to another.

It's not difficult to determine whether or not your feed program is appropriate for the work your horse is doing, but it does take some time and a little effort--and a calculator. To establish what kind of nutrition your horse is getting, you need to start with an analysis of your hay. Many feed companies and agricultural extension offices offer hay analysis at a nominal cost (usually somewhere in the \$25-\$50 range). The procedure is fairly simple: samples will be taken from the middle of a number of bales of your hay, mixed, and a representative portion of that is submitted to a lab for analysis.

A standard hay analysis will tell you the crude protein content of your hay, express its digestibility in terms of the acid detergent fiber, and give you an idea of its vitamin and mineral content. Two figures you'll want to examine closely are the values for calcium and phosphorus, two "macrominerals" that are pivotal to the construction and well-being of your horse's bones, teeth, and muscles. Alfalfa hay will be much higher in calcium (1.3%) than grass hay (0.5%). Grass hay alone might not be an adequate



CHERYL MANISTA

**Horses in high-stress situations, such as racing or showing, can benefit from a general vitamin supplement.**

calcium source for the broodmare or the growing horse.

Grains, on the other hand, are high in phosphorus and low in calcium. Overall, you want to achieve a Ca:P ratio that is at least 1:1 in your horse's total diet (that is, the calcium numbers should be at least as high as the phosphorus). Feeding hay and grain usually results in a very appropriate calcium/phosphorus balance for most adult horses, but this is not necessarily true for the young, growing horse (i.e. grass hay and oats would be suspect in calcium status).

In fact, there's considerable leeway, since horses tolerate extra calcium well (up to 6:1 Ca:P) as long as phosphorus levels are sufficient. But when the ratio inverts (more P than Ca), trouble begins. The horse's system seeks to balance the concentrations of the two minerals, so it can leach calcium from the bones and reintroduce it into circulation, resulting (eventually) in weak and porous bones that are prone to injury and breakage. This condition can be particularly serious in young horses which are in the process of bone-building.

Through hay analysis, you probably will discover that the potassium level of your hay is high (usually somewhere between 1% and 2.5%). Hay supplies all the potassium most horses, even those in hard work, ever need. Commercial electrolytes, which are designed to replenish the minerals lost in sweat when a horse performs at a high intensity level, are made up largely of sodium chloride and potassium chloride. Only horses in heavy competition or under high physical stress, especially in conditions of high heat and humidity, sometimes demonstrate potassium deficiency and can benefit from supplementation.

What about vitamins? Hay and forage tend to contain high levels of vitamins A, E, and K, and if sun-cured, of vitamin D as well. But vitamins tend to break down over time, so the older your hay is, the lower its vitamin content. By the time a bale of hay is a year old, its vitamin A content, for example, is next to nothing. Moldy, poorly cured, or poor-quality hay also will have a lower-than-normal balance of vitamins as well as potentially cause digestive problems. A hay analysis will give you some indication of the vitamin content of your hay and help you decide whether supplementation might be needed.

### **The Grain Gain**

Now that your hay is analyzed, it's time to take a good look at your horse's grain ration. If you are feeding a commercial grain ration--a pelleted or extruded feed or a sweet feed--much of the work has been done for you; most of the information you'll need is printed on the feed tag. What isn't printed on the tag should be available from your feed dealer or sales person, if you ask.

On the other hand, if you mix your own ration or feed plain grains, such as oats or corn, you will have to do more calculating, and it is worth investing in a copy of the National Research Council's standards for horse nutrition, which lists the nutrient content of virtually every type of horse feed as well as discussing vitamin and mineral levels and the requirements of horses of different ages and types. (See our chart on page 90 for a quick reference.)

Now, with your grain feed label in one hand, and hay analysis printout in the other, you can begin to get an idea of how much of each nutrient is contained in your horse's daily ration. If your hay is of good quality, and your grain a respectable commercial mix, chances are your horse's overall diet will meet the standards of the NRC's recommendations for adult horses. But it's educational to do the calculations anyway, at least for the top five or six ingredients listed on your feed tag (crude protein, crude fat, crude fiber, sodium chloride, calcium, and phosphorus). Be sure to take into account the amount (weight) of each ration you feed per day--e.g., five pounds of grain and 15 pounds of hay. You'll also want to double-check that the units are the same; some minerals, for example, might be expressed as "parts per million" (or the equivalent unit, mg/kg), while others are described in terms of percentages (parts per hundred). Vitamins usually are listed in IU, which is short for "international units."

Pay special attention to the calcium:phosphorus ratio of your feed program. Since calcium and phosphorus are expressed as a percentage on feed tags, it's easy to compare them to the values you have for your hay, and calculate a Ca:P ratio. If you come up with an inverted ratio (more phosphorus than calcium), you will want to consider supplementing calcium.

Take a good look at selenium levels, too. This is a mineral which, in combination with vitamin E, plays an important role in your horse's immune function. In many parts of North America, the soils are extremely selenium-deficient, so it's quite possible for your horse to develop a deficiency if he is eating hay and grains grown on such soils. (There also are small pockets of land where the soils are so selenium-rich that grazing pasture there can cause selenium toxicity! If you're not sure about your local soil conditions, ask at your feed store or local agricultural extension office, or arrange to have a soil analysis done.) Horses should receive about 0.3 mg of selenium in the total diet (not more, as the toxicity threshold for this mineral is unusually low); if the hay is low in selenium, then feeding a 50% hay and 50% commercial concentrate diet might not supply sufficient selenium. (Most commercial horse concentrates will contain about 0.3 parts per million selenium.)

Other vitamin and mineral deficiencies might surface as well, or you could find that your feed supplies all of your horse's requirements adequately. If you feel overwhelmed by the task of calculating your horse's nutritional intake, consult your local feed store or agricultural university, which can put you in touch with an equine feed specialist who'll be able to help you analyze your horse's diet. Then, once you've pinpointed the problems, it's time to consider ways in which to solve them.

### **Balancing The Ration**

Imbalances (whether they are deficiencies or excesses) in the ration should be addressed to keep your horse in optimum health, but supplements are not the only way to accomplish this. It often is more cost-effective to consider changing your feed. Some feed companies have focused specifically on updating nutrient levels to supply state-of-the-art nutrition, and many have feeds that offer complete nutrition for different age groups and work requirements (when fed with good-quality hay). Frequently, these feeds end up being more cost-effective in the long run, despite their initially higher cost, because they require no supplementation. And they have the added advantage of delivering those nutrients in the way they're most likely to be eaten--already mixed into the feed. When you feed powdered or pelleted supplements, you always run the risk that your horse will sort out the "yucky" ingredients and leave them in a conspicuous pile in his feed tub.

One of the most common reasons for supplementing a horse is to adjust a feed program that works very well for most of the horses in your barn, but fails to meet the needs of an individual horse which might have different nutritional requirements. Say, for example, that you have a pregnant broodmare, or a young and growing filly. She will have higher protein and mineral needs than the mature geldings and "open" mares which make up the rest of your herd. Those horses' needs easily can be met by supplementing your basic ration with a protein and mineral supplement formulated to support growth, pregnancy, and lactation.

There are a number of commercial protein supplements available, as well as products such as soybean meal cake or linseed cake. For young foals and orphan foals, pay close attention to the quality of the protein source, choosing a product based on milk protein if possible, because its amino acid profile is best suited for supporting correct growth. Soybean meal is a good and cost-effective protein source for a creep feed or weanling ration. If you're supplementing a broodmare, choose a good-quality plant protein source, preferably based on soybean. Read the labels carefully. Some supplements supply protein only; others combine extra protein with minerals and/or vitamins, which you will have to take into account in your calculations.

All of this is complicated by the fact that some nutrients need a little help in order to be utilized by the horse's system. For example, high levels of copper have been shown to be beneficial in the prevention of developmental orthopedic disease (DOD) in young growing horses. The National Resource Council would range from 50-80 mg per day. However, current research suggests that copper should be fed at about 150 mg per day to the young, growing horse. But, high levels of copper will not be absorbed unless there are sufficient dietary levels of zinc and iron. If either of those minerals is present in too high a concentration, it can interfere with copper utilization, resulting in a clinical deficiency!

A supplement might contain more ingredients than the ones you're looking for, and it can be very difficult to determine whether they're there for a purpose, or just as window-dressing. For example, if you wish to supplement biotin to encourage better hoof growth, you can buy a product that contains only biotin, or one with added zinc, copper, and DL-methionine. The supplements with more "bells and

whistles" might sound good, but remember that more is not always better. Look for supporting documentation that explains why those ingredients are included.

It's also important to remember that it *is* possible to get too much of a good thing. Most vitamins and minerals have a wide margin of safety, but if they're zealously overfed, it's possible to overdose your horse on the fat-soluble vitamins A, D, E, and K. Special care must be taken with regard to two minerals, selenium (which we mentioned previously) and iodine, both of which have low toxicity thresholds in horses. Do not feed a supplement containing selenium if your grain ration contains added selenium. Be careful to feed iodine-rich supplements (usually based on kelp) only in areas where the soils are iodine-deficient, and only in combination with feeds that are not iodine-supplemented. Iodine toxicity can be particularly difficult to diagnose, as it produces symptoms almost identical to those for iodine deficiency! It's far better to analyze your diet before you supplement than to have to figure out where you've gone wrong later, when your horse is suffering symptoms of his nutritional imbalance.

## **Vitamins And Minerals**

There are several instances in which it might be beneficial to feed a vitamin supplement. Horses which have been on prolonged broad-spectrum antibiotic treatment for an illness or infection, for example, could be at risk for deficiencies of vitamin K and the B vitamins. Both of these vitamins normally are synthesized in the gut by beneficial intestinal bacteria, and these bacteria are compromised by antibiotics.

Horses in high-stress situations, such as frequent traveling, showing, or racing, and horses which are eating poorly (for example, those recovering from surgery or illness), also can benefit from a general vitamin supplement. Any horse which is on a high-grain, low-forage diet (such as a young racehorse in heavy training), which is eating very poor-quality forage, or being fed hay that is more than a year old, also should receive supplemental vitamins.

Among minerals, calcium probably is the mineral that most frequently needs supplementing. Consider adding calcium, in the form of calcium carbonate, to your horse's diet if you are feeding a grass hay *and* large amounts of grain, especially bran, or if you are feeding grass hay to a lactating broodmare or a growing weanling or yearling. If you are feeding a legume hay, calcium supplementation usually isn't necessary.

What about supplements that claim to enhance your horse's diet or health, rather than merely correct deficiencies? There are some nutritional ingredients which, when fed at levels higher than the NRC recommendations, can have a beneficial effect on health. The B vitamin biotin, which is helpful in some cases of poor hoof growth, probably is the best-known of these. But, be wary of vague and unsupported claims; herbal supplements, in particular, often are guilty of packaging blurbs such as "immune boosting" or "cleanses impurities," which tell you little or nothing about the product's purported function. Just because a product is "natural" doesn't necessarily mean it is harmless; some herbs are powerful drugs and should be treated as such, even if their "nutriceutical" classification means they slip through the cracks of government regulation.

Finally, don't let your enthusiasm run away with you. Feed only according to the package directions; twice as much supplement won't get you faster results, and could have dangerous consequences.

## **Getting More Out Of What You've Got**

Getting the most use out of the vitamins and minerals you are supplying to your horse is a matter of digestibility and degree of absorption across the gut wall to the muscles, bones, blood, and to individual cells. Of course, none of the products are likely to be absorbed if your horse objects to the taste and refuses to eat them! Supplement manufacturers have tackled the digestibility and palatability issues in a number of ways.

One of the simplest and most effective approaches is to bind the vitamins and minerals into a pellet form--usually with some grain content and molasses or other flavoring to hold it all together and improve the taste quotient. Other supplements keep the nutrients in the form of a powder, feeling that the process of binding pellets together decreases the effectiveness of the mineral. If you use a

powdered supplement and you have a fussy eater, it's best to mix it in with a sticky sweet feed, so that it doesn't sift out of the ration. Or, you can stir it into some moist beet pulp or a blob of applesauce. Otherwise, you might find that your horse regularly is leaving a little pile of powder in the bottom of his feed tub.

Vitamins tend to decompose in any sort of feed product, especially when exposed to sunlight, heat, air, or processing in the feed mill. When mixed outside the horse's body, some vitamins also are incompatible with each other, or with minerals that might be in the mix. (For example, most vitamins are prone to oxidative destruction by iron, copper, sulfates, sulfides, phosphates, and carbonates, all of which might be present in a supplement formulation.)

Vitamins A, D, K, and thiamin (B1) are particularly vulnerable, and of these, vitamin A is the most crucial, since it's the only one the horse cannot manufacture within his own body. So, supplement companies go to great lengths to protect the viability and efficacy of vitamins by coating them with gelatin, wax, sugar, or ethylcellulose (all of which are, fortunately, harmless to the horse in the minute amounts required). These compounds sometimes make up a large proportion of the composition of a powdered or pelleted supplement.

Still other manufacturers put their formulas in a liquid format. Use caution when choosing one of these. Not only are liquid formulations generally more expensive, but because it's difficult to cover vitamins with any sort of protective coating in the liquid format, a supplement rich in B vitamins, iron, and copper--commonly sold as a "blood builder"--might undergo complicated chemical reactions that in essence cancel out all the vitamins and render the ingredients useless!

The digestibility of minerals is surprisingly low, according to nutritional research, and varies widely from mineral to mineral. For example, the absorption rate of iron ranges from 2% to 20%, while calcium is utilized at about a 40% rate. Phosphorus tends to be absorbed at a 70% rate. Increasingly, feed and supplement manufacturers have been looking to improve the absorption percentages. Several patented processes currently are on the market, and all of them claim to improve the amount of useful mineral in a supplement. Most are based on biochemistry, but the research "jury" is still out on their efficacy.

Chelation of minerals is one process you might hear about--chelating a mineral involves binding it to two or more amino acids to form a stable, biochemical ring compound, which can be metabolized as much as 300% to 500% more efficiently in the horse's gut than the mineral on its own. Unfortunately, chelation seems to work better for some minerals than others, so there is no one magic formula that improves absorption across the board. Furthermore, the addition of more minerals to the diet to increase net absorption might be much more cost-effective than the addition of chelated minerals.

## **Making It Work**

When buying feeds and supplements, be hard-nosed. Know exactly what you are buying and exactly what it is going to do for your horse. Avoid products with wild claims or disturbingly vague lists of ingredients ("a secret blend of herbs and spices" just isn't enough information!) and go for the facts. If in doubt, don't use it. No matter how much we enjoy adding powders and potions to our horse's meals, most equines being fed a commercial grain ration and good-quality hay will never suffer a serious vitamin or mineral deficiency, and are likely doing just fine without the "extras" we want to add.

When feeding a supplement, be sure to consult your nutritionist or veterinarian to avoid overfeeding the supplement and potentially causing problems with other nutrients.



**Readers are cautioned to seek the advice of a qualified veterinarian before proceeding with any diagnosis, treatment, or therapy.**

*Copyright © 2009 BLOOD-HORSE PUBLICATIONS. All rights reserved. Reproduction in whole or in part in any form or medium without written permission of BLOOD-HORSE PUBLICATIONS is prohibited. THE HORSE, THE HORSE logo,*

*THEHORSE.COM and THEHORSE.COM logo are trademarks of BLOOD-HORSE PUBLICATIONS.*