

# HEALTH ZONE *Nutrition*

## Common Nutrient Deficiencies

BY SHARON BIGGS WALLER  
ANNE M. EBERHARDT PHOTOS

For the most part, horse owners have little to fear when it comes to nutrient deficiencies in their horses' diets. Nowadays many horses consume commercially prepared feed balanced for their energy, protein, vitamin, and mineral needs.

Dr. Kathleen Crandell, equine nutritionist at Kentucky Equine Research, explained that most horse owners in the United States have access to good-quality forages, and North American horses live fairly healthy lives. However, we shouldn't take these things for granted.

"Nutrient deficiencies in the U.S. tend to be subclinical rather than clinical," she said. "Clinical means there are obvious signs. Subclinical means symptoms are vague. If the horse is not taking in enough nutrients, the problems may show in subtle ways. For example, a front-end lameness could be the result of an imbalance of calcium and phosphorus in the diet. We might put the blame on exercise or an accident, and not relate it to nutrient deficiencies."

### At-Risk Horses and Common Deficiencies

Dr. Kristen M. Janicki, performance horse nutritionist for Mars Horsecare US

Inc. and Buckeye Nutrition, said horses at risk for developing nutrient deficiencies include high-level performance horses, pregnant and lactating mares, growing horses up to 2 years of age, and horses that are stalled 24/7 on an all-hay diet with no pasture access.

"Also at-risk are horses living in a state deficient in certain nutrients," she said. "A lot of minerals vary depending on location, soil content, and the species of plants growing. Drought conditions can

hance immune function, facilitates cellular respiration, aids DNA synthesis, and improves the absorption and storage of vitamin A, among other roles. Fresh grass contains high levels, but these drop once the grass is cut for hay and stored. There are two diseases associated with a vitamin E deficiency: equine motor neuron disease, a rare oxidative disorder that impacts motor neurons in the spinal cord, and equine degenerative myoencephalopathy, a disease characterized

## Depending on lifestyle and location, some horses might be at risk for suffering subtle but serious vitamin and mineral imbalances

affect minerals, too. But we do know that areas with soil deficient in selenium (for example) include the Midwest, East Coast, and some parts of the West Coast."

Selenium supports horses' immune function, so a lack of it can impede a horse's ability to fight off infection.

Crandell noted horses on hay-only diets can become vitamin E deficient over time. This potent antioxidant en-

by brain stem and spinal cord deterioration. Testing is the only way to know for sure if a forage is deficient in E; horses on hay-only diets might need vitamin E supplementation.

Researchers have shown that horses' bodies absorb and utilize natural vitamin E better than they do the synthetic, said Crandell.

So if you choose to supplement, she suggested checking the product's label to see what type of vitamin E (tocopherol) it contains: Natural vitamin E is d- $\alpha$  tocopherol, and synthetic vitamin E is dl- $\alpha$  tocopherol.

Vitamin A is important for vision, bone and muscle growth of young horses, reproduction, healthy skin, and immune response to infection. Crandell said horses get their vitamin A from forage but, similar to vitamin E, levels begin to decrease once the grass is cut for hay.

"When green, grass has plenty of carotene, which is the source of vitamin A," she explained. "But when you start feeding only hay, sometimes horses don't get enough A. Usually A isn't a vitamin of concern because it is added into almost all commercial horse feeds, and if a horse gets enough green grass it's not an issue at all."

Vitamin C is an antioxidant that helps boost the immune system, noted Crandell. Horses' bodies produce vitamin C naturally, but when stressed



High-level performance horses, such as Thoroughbreds in training, are at risk for developing nutrient deficiencies



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## COMMON NUTRIENT DEFICIENCIES... LET'S MAKE THEM UNCOMMON

The nutrient deficiencies we read about today seem routine and everyday, so common we nearly know them by heart. After 30 years in my horse nutrition practice, we still talk about the same nutrient deficiencies. Not much progress has been made. Do you wonder why?

1. The most up-to-date information on nutrient requirements is often not applied properly, which leads people to make the same mistakes that were made 30 years ago. Why? Because good hay is hard to find and expensive to buy. Horses are herbivores—they are designed to eat plants. We are not going to change the digestive tract Mother Nature gave them. But analyzing hay, sampling pastures, and adding only what is needed requires time, effort, and some money. If you lose a mare or foal, however, or need surgery to fix a young horse or your horses don't win, what does that cost per year? Wouldn't it be wise to use the best research and buy the best hay or grain?

2. Nutrition is complex and ever changing. Don't let someone dummy it down and pretend it is a simple matter. Stay on top of nutrition and make changes every season and every year. Climates change, hay comes from dif-

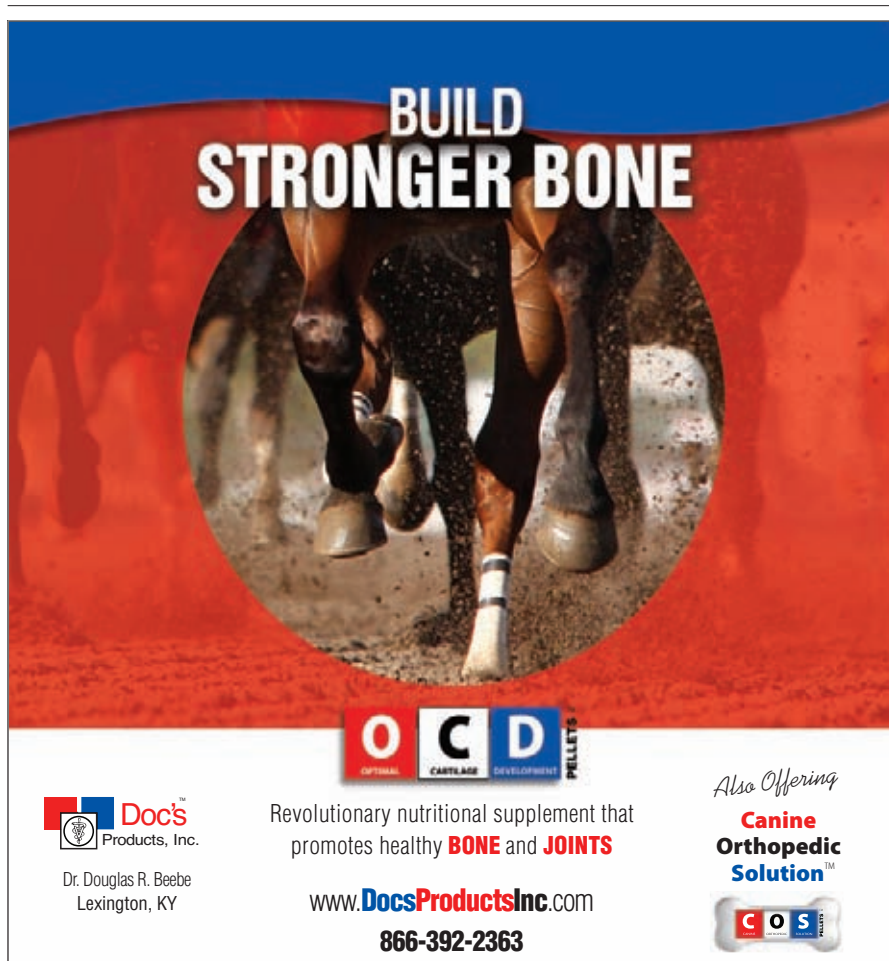
ferent parts of the country where soil, mineral, and management conditions vary; horses have different genetics that affect the way nutrients are digested, absorbed, and metabolized. Don't be afraid to ask for professional help. Read articles, ask questions, and utilize nutritionists or veterinarians that specialize in nutrition. Invest in the best hay, grains, and pastures. Nutrition is not the place to pinch pennies.

3. Support nutritional research to solve unanswered questions. Donate to a university or foundation that has an equine nutritional research effort. If you have problems that can be traced back to nutritional origins, help solve the problem before another 30 years have passed and countless more horses are lost or crippled. Invest in nutrition and make uncommon things happen.

*By Dr. Ginger Rich*

*Ginger Rich works with Canadian feed company Semican through her Rich Equine Nutritional Consulting*

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they might not make enough.

“We’re talking long-term stress,” she added. “Weaning a foal would be an example. In a study looking at blood levels of vitamin C in foals being weaned, the levels dropped during that stressful time.”

Horses off their feed due to illness and/or stress can develop B vitamin deficiencies. The equine hindgut (the large intestine, which consists of the cecum and the colon) contains billions of microbes that



Dr. Kathleen Crandell  
of Kentucky Equine Research

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digest forage and produce B vitamins, which have a variety of functions such as maintaining healthy skin and muscle, promoting cell growth and division, and enhancing the immune and nervous systems.

"If a horse isn't eating enough or if their hindgut is too acidic (due to too much grain and not enough forage) or if the horse has a fever or colic, the hindgut can become out of balance, which compromises production of B vitamins," Crandell said. "But again, good-quality feeds have B vitamins included in the mix."

Some trainers and owners believe low magnesium causes nervousness and insulin resistance in certain horses, although Crandell said she rarely sees a diet that is low or deficient in magnesium.

"People are feeding magnesium in therapeutic doses to calm a horse, and some say it reduces the thick, cresty neck and the risk of foundering in insulin resistant horses," she said. "So far, there are no scientific studies supporting this claim, and results are largely anecdotal."

A diet can be salt-deficient, causing metabolic issues, if a horse does not have access to salt.

"Forages are low in sodium and chlo-

## THE OTHER EXTREME

We've discussed the perils of nutrient deficiencies, but what happens when your horse receives more than he needs?

"Usually the body will get rid of the extra," says Dr. Kathleen Crandell, equine nutritionist at Kentucky Equine Research. "But it depends on what it is. For instance, vitamin E is not a problem, and the B vitamins wash out. You can overfeed D, but that would take a lot."

Signs a horse is consuming excess minerals include poor coat and skin condition, bone problems, diminished performance, and even death. Crandell listed some conditions to watch for that are caused by consuming excess vitamins and minerals:

- Excess vitamin D leads to calcium buildup in soft tissues, causing them to become stiff and inflexible. The resulting pain might warrant euthanization.
- Calcium and phosphorus must be

in balance with each other or a horse can develop nutritional secondary hyperparathyroidism or "big head disease" (enlargements of the facial features and head). Crandell noted this is uncommon in the United States.

- Excess vitamin A can cause bone fragility, thickening of bone tissue, developmental bone abnormalities, skin problems, and liver toxicity that can kill the horse, "but it takes a lot of vitamin A, and I've never come across it," Crandell noted.

- Too much selenium can cause joint stiffness, lameness, rough hair coat, mane and tail loss, and hoof sloughing. "They say Custer died from selenium toxicity," said Crandell. Rumor has it the mules carrying reinforcements to Custer couldn't get to the Battle of Big Horn because they had consumed forages with toxic levels of selenium and were lame.

By Sharon Biggs Waller

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Forages are low in sodium and chloride (together they make salt)

ride (together they make salt), and commercial feeds usually only add less than 0.5% salt to the feed," Crandell explained. "Deficiency signs in the idle horse are not obvious but are much worse if the horse is exercising and sweating."

Sometimes it's not a deficiency that causes a problem but, rather, an imbalance. The mineral calcium is important for muscle contraction, cell membrane function, and blood coagulation, and phosphorus is important for energy transfer. Deficiencies in these minerals are rare, said Crandell, but ratio imbalances can mean detrimental effects.

"Calcium and phosphorus need to be balanced in a 1-1 ratio for adult horses; growing horses need 2-1 (ratio, calcium to phosphorus)," Janicki explained. "If that ratio is inverted you'll have definite bone problems, such as osteochondritis dissecans—a cartilage disorder characterized by the presence of large flaps of cartilage or loose cartilaginous bodies within a joint—and epiphysitis (inflammation of the ends of the long bones), in your young horse."



Indiscriminately adding supplements to your horse's diet has the possibility of throwing off the balance

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## Is My Horse Deficient?

Our sources noted there's no easy answer to this question, and to complicate matters further, Crandell said blood tests aren't conclusive. Veterinarians can measure certain vitamins and minerals reliably, such as selenium and vitamins B, D, and E, using blood tests, but they can't accurately measure vitamin A (which is stored in the liver) and the minerals calcium, phosphorus, and magnesium.

"The reason for this is because of homeostatic regulation in the blood, which means the body tries to keep the same level in the bloodstream," she said. "So, when needed, (these vitamins and minerals) will be released from the stores in the body, such as in the bones and liver, and put into the blood. So a blood test can appear normal, even if the horse is deficient."

**Sometimes it's not a deficiency that causes a problem but, rather, an imbalance.**

However, horses can exhibit clinical signs specific to each vitamin and mineral deficiency. Janicki said that abnormal behaviors, premature fatigue and other performance problems, or issues with grazing and consuming feed (and no outward signs of any other disorder) can indicate nutrient deficiency.

## Correcting an Imbalance

Our sources agree that you must be cautious when correcting an imbalance so as not to overcorrect and provide too many minerals and vitamins.

"You have to be careful and look at the amount the horse is receiving in his concentrate already," said Janicki.

Both sources recommend contacting an equine nutritionist for advice on correcting imbalances. Many feed companies offer consultations free of charge.

"Talk to a nutritionist and see if there's an issue that can be explained," Janicki said. "Most nutrient deficiencies can be reversed. The severe ones are iodine, in which case the horse will have a goiter (an enlarged thyroid gland, visible as swelling behind the jaw); and the calcium and phosphorus

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ratio imbalance, which can cause skeletal issues.”

Janicki warned that the last thing you want to do is start feeding vitamins and

minerals indiscriminately when you think your horse is deficient in a nutrient.

“More than likely the problem can be more than one thing,” she said.

## Simple Solutions

There are three ways to tailor your horse's diet so he receives the nutrients he needs. First, if he doesn't need the calories from grain supplies, simply provide a mineral block or loose minerals plus good-quality forage. If you live in a selenium-deficient area, look for a product that contains this mineral. If you do offer a commercial feed, also provide a salt lick because, as mentioned, the amount in these feeds does not usually meet horses' requirements.

“They've done studies on whether horses have enough nutritional wisdom to eat the nutrient they are lacking, but apart from an appetite for salt, they don't appear to,” said Crandell. “Nowadays nutrients are mixed with salt to get the horse to eat them. Horses aren't looking for selenium, but they will get some when they come over for salt.”

The second choice is offering a ration or hay balancer. Janicki said this is a good choice for a horse that doesn't need a significant source of calories.

The third choice is providing concentrated feed, to which manufacturers have added vitamins and minerals. But just any concentrate won't do, said Crandell—it's important to choose the product formulated for your horse's circumstances.

“For instance, if you have a broodmare, you want the product for broodmares,” she said. “But you must make sure you feed at least the minimum of the recommended daily amount or else the horse won't get all the nutrients he or she needs. If the minimum recommended amount is too much for the horse, then look for a lower intake feed or ration balancer or add a vitamin and mineral supplement.”

## Take-Home Message

Don't hesitate to seek advice from a nutritionist, said Janicki. “The majority of the horse's diet is forage, so have your hay tested by your feed company or cooperative service extension,” she said, to get a baseline for your horse's nutrient intake.

“Also remember that indiscriminately adding supplements to your horse's diet has the possibility of throwing off the balance. In short, consider the entire diet from forage to concentrate.” **BH**

Excerpted from *The Horse: Your Guide to Equine Health Care*. Free weekly newsletters at [www.TheHorse.com](http://www.TheHorse.com)

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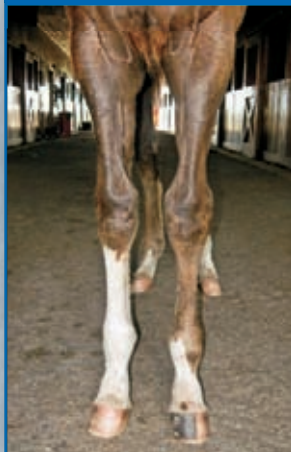
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