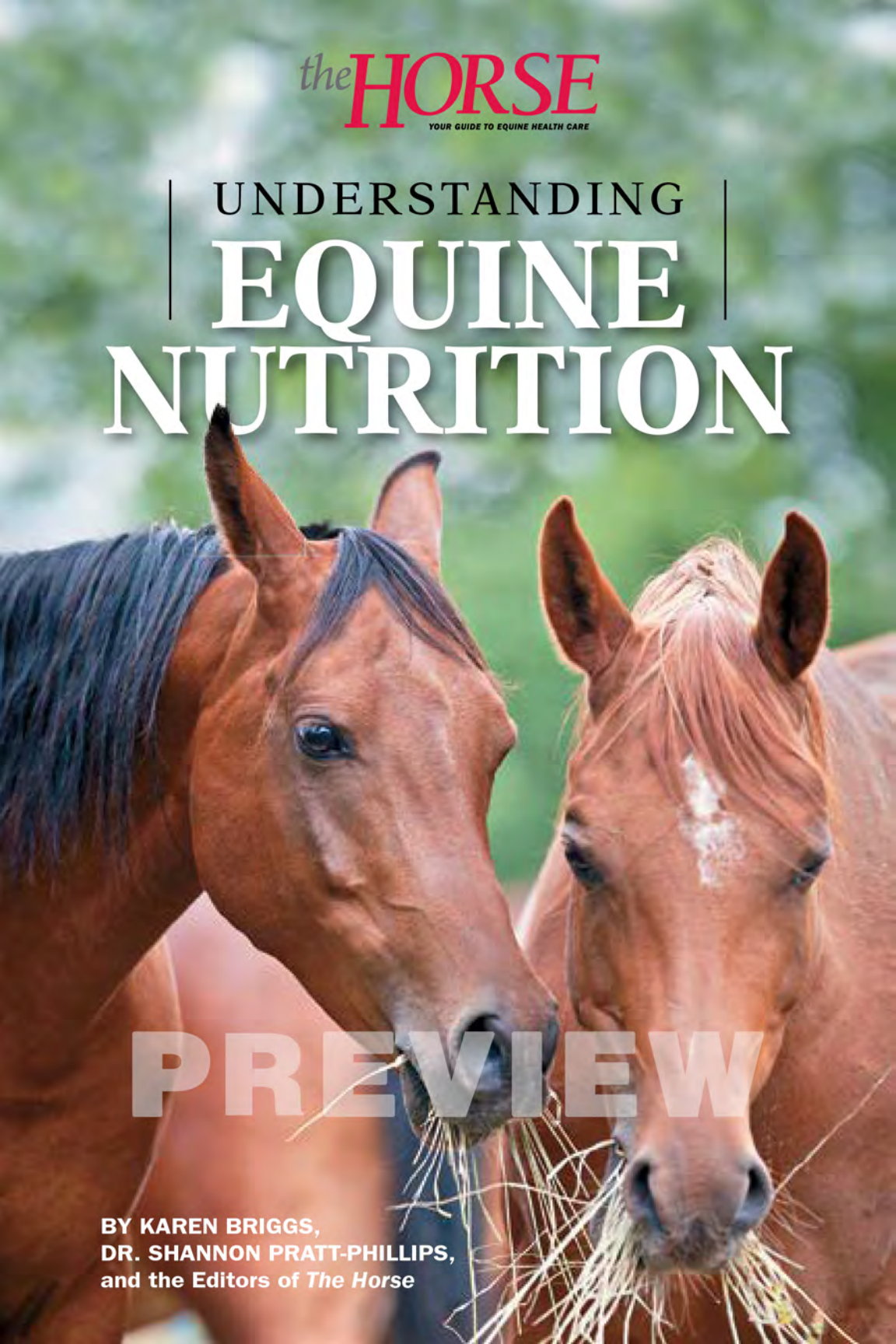
the HORSE
YOUR GUIDE TO EQUINE HEALTH CARE
UNDERSTANDING
EQUINE
NUTRITION
PREVIEW
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Feeding Basics

It's often been observed that horses are simple creatures. And while the phrase might have been unkindly intended to describe a lack of intellectual complexity, it's pretty accurate when it comes to their nutritional needs.

Unlike us humans with our omnivorous tastes, horses are strictly plant-eaters. Forage is the basis of the equine diet, and when the forage is of good quality and in plentiful supply, horses suffer few digestive difficulties. It's only when we deviate from the "forage principle" that our horses run into trouble.

At first glance, however, the equine digestive tract seems to be something of an evolutionary mistake. Take the equine stomach, for example. It's surprisingly small for an animal the size of the horse — with a capacity of only about 2 to 4 gallons (or 7.5 to 15 liters). In contrast, the small intestine can measure an amazing 70 feet (about 22 meters) in length, if uncoiled and stretched out, with a diameter of 3 to 4 inches and a capacity for 10 to 12 gallons of material. Compared with what we know about the physiology of other animals, the horse's equine gastrointestinal (GI) tract seems strangely out of proportion. But from Nature's point of view, everything's just fine. In his wild state, the horse never expected to ingest large quantities of food at one sitting; his digestive system is optimally designed for his wandering, grazing lifestyle.

Let's take a slightly more thorough tour through the equine innards and see what else we can discover about the link between his physiology and his diet.

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Protein

PROTEIN

Of all the components of your horse's diet, protein is probably the most misunderstood. Long assumed to function as an energy source for the body, protein mainly functions to provide amino acids (the building blocks of bones, muscles, and soft tissues) for growth and repair.

What are amino acids good for? Virtually all of the horse's vital processes, it seems. Amino acids are involved in the synthesis and release of hormones, the synthesis of neurotransmitters and enzymes, and the regulation of sleep, appetite, and blood pressure, to name just a few. But primarily, amino acids are needed for the formation and repair of muscle tissue and other soft tissues throughout the body. On a fat-free, moisture-free basis, they account for approximately 80% of a horse's total structure.

Growing horses, which are "building" new tissues as they mature, and horses used for breeding, have higher protein requirements than do mature horses being used for pleasure or performance. Whether working or idle, most mature horses need surprisingly small amounts of protein.

Inside a Protein Molecule

Proteins are "chains" made up of various combinations of the 22 amino acids that exist in nature. Amino acids are relatively simple organic compounds, consisting of a basic amino group and an acidic carboxyl group. Carbohydrates and fats also contain carbon atoms with hydrogen and

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Fiber

Grazing is a full-time job for horses. Given their druthers, they would graze for 12 hours or more every day, their broad, flat teeth and sideways chewing motions making short work of the tough, stemmy grasses and weeds they favor. Like all true herbivores, horses get most of their daily energy requirements from eating plant fibers.

While we often provide grain and supplemental fats to our domestic horses to give them the energy to do hard work, it's important to remember that horses were meant to use fiber as fuel — and fiber remains the most important ingredient in every equine diet. It provides all the energy horses need for everyday maintenance metabolism: ordinary functions such as breathing, walking, grazing, and sleeping. Without adequate fiber the horse's digestive system doesn't function properly — it loses the ability to move food particles efficiently through the gut. Also, its ability to conserve water and electrolytes is compromised. Without fiber in the digestive system, high-carbohydrate feeds tend to "pack" in the gut, as well. The result is a horse at risk for dehydration, colic, and laminitis (not to mention stable vices such as cribbing and wood-chewing, which often develop when a horse's fundamental urge to chew is not satisfied).

Except in the most strenuous circumstances (such as 2-year-olds in heavy race training), fiber always should make up at least 50% (by weight) of your horse's daily diet. And for the vast majority of adult horses, that percentage can be pushed considerably higher — even to 100% if the horse is an easy keeper and/or is not being asked to do work. The basic principle is this: Grain is an optional part of a horse's diet; roughage (fiber) is not.

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Energy and Carbs

If forages provide the "maintenance" energy horses need for the workings of everyday life — grazing, sleeping, wandering from pasture to pasture, maintaining internal temperature — then cereal grains are the turbocharged portion of the diet. Their main function is to provide higher concentrations of energy, in the form of carbohydrates such as starches, so the horse can do the work we ask of him.

The amount of energy your horse needs rises in direct proportion to how fast, how long, and how hard you expect him to perform. At the lowest end of the spectrum are horses that are idle, or perhaps work only a few times a week at a very slow pace. Most pleasure horses fall into this category. At the opposite end are racehorses, which probably work harder than any other category of equine athlete (particularly because they're often asked for peak performance while they're still physically immature). Somewhere in between might be your equine athlete — whether he's a Western performance horse, a Grand Prix jumper, a polo pony, or one of a four-in-hand driving team. His energy requirements will more than likely not be completely met by hay or pasture alone.

Work isn't the only thing that can raise a horse's energy requirements above the maintenance level. Environmental conditions, his physical fitness, and his degree of fatigue all play roles. Even when all of these factors are identical, individuals can vary in their energy needs. We all know of high-strung horses that are "hard keepers" and their metabolic opposites, the easy-going types that maintain weight, even in hard work. Both breed type and temperament play roles here.

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Fats

If there's a nutritional buzzword for the 21st century, it's fat. We humans still might not understand fully the differences between saturated and unsaturated fats, let alone "good" cholesterol and "bad" cholesterol — but we all know how to count our fat grams! While we struggle to keep our diets as low-fat as possible, fat has a different focus when it comes to the horse … because only in recent years have we recognized the value of raising the fat levels in an equine athlete's diet.

Of course, the average human diet (at least in North America) contains far more than the maximum 30% fat recommended for good health. In contrast, the horse's natural diet contains very little fat. Forages, fibers, and most grains fed to horses only contain between 2% and 3.5% fat overall. While this leaves the horse at low risk for cardiovascular clogging, it does mean that, traditionally, carbohydrates have been considered the obvious and "natural" energy source for performance horses, and fat has rarely been considered beyond that little splash of oil for a shiny coat. Only in the past couple of decades have we begun to realize that fat is also a valuable energy source — one with many advantages.

High-fat diets (anything above the 2% to 3.5% supplied by a standard grain-plus-forage diet) provide several perks, most notably in terms of energy production for high-level equine performance. Pound for pound, fat supplies about 2.25 times as much energy as the equivalent weight of carbohydrates (traditionally supplied by grains such as oats, corn, or barley) and protein. If you wish to supply more energy to your horse without significantly increasing his overall feed intake, supplementing his diet

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Vitamins

Vitamins are tiny organic compounds with a huge impact on the health and well-being of your horse. Sometimes gleaned from the diet and sometimes manufactured within the digestive tract, vitamins have the power to promote and regulate virtually all of the body's normal functions, and they need be present only in minute amounts.

Researchers have classified vitamins into two categories that describe how the vitamins are absorbed, stored, and excreted by the body: fat-soluble and water-soluble. Vitamins A, D, E, and K are fat-soluble vitamins, which tend to be stored in the body (and, thus, can build up toxicities if there is an excess), while the B vitamins and vitamin C are water-soluble, meaning any excess not used quickly by the body tends to be excreted rather than stored.

Vitamins also can be classified according to their source. Under normal conditions, the horse quite efficiently produces his own vitamins C, D, and niacin (one of the B-complex vitamins) from other organic molecules he ingests. The beneficial microbes living in his cecum and large intestine, as part of their symbiotic bargain, produce all of the other B vitamins as well as vitamin K. Only vitamins A and E are not produced within the horse's body and must be obtained from vegetable matter in the diet.

We still don't know much about vitamins, and much of what we do know is misunderstood. One of the most common misconceptions about vitamins is that "if some is good, more is better." Horses can become vitamin-deficient, and these deficiencies can have devastating effects on their normal functions, but equally dangerous are toxicities from an

CHAPTER 7

Minerals

Of all the ingredients of a horse's diet, minerals are unique. They make up only the tiniest fraction of the weight of the daily ration, yet they're critically important for dozens of daily bodily functions. They contribute no energy and contain no carbon. In fact, essentially, they're rocks — and it can be difficult to imagine their being digested by a horse (or by a human, for that matter).

But without minerals, horses could not metabolize fats, proteins, or carbohydrates; their muscles and nerves would not function normally; and their bones could not support their own weight. Minerals help the blood transport oxygen throughout the body, maintain the body's acid/base and fluid balances, and are necessary components of virtually every enzyme the horse needs for everyday metabolism. They are integral parts of some vitamins, hormones, and amino acids. Yet they make up only about 4% of the horse's total body weight (as compared to 30% to 35% fats, carbohydrates, and proteins and about 60% water). In the case of minerals, a little means a lot.

Minerals are generally divided into two categories: macrominerals, those needed in larger quantities (relatively speaking) in the daily diet, and microminerals, or trace minerals, those needed only in infinitesimal amounts (usually expressed as parts per million, or ppm — or sometimes as the equivalent unit, mg/kg). Macrominerals, which include calcium, phosphorus, magnesium, sodium, potassium, sulfur, and chlorine (as chloride), are described in g/kg, or as percentages. To provide some perspective, the micromineral "unit," ppm, is 10,000 times smaller. Iodine,

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Hay and Forage

Now that we've discussed at great length the basic components of the equine diet, let's look at how we can use various foodstuff to provide an ideal nutritional balance.

We've said it before; we'll say it again: Forage should be the basis of any equine diet. So understanding pasture, hay, and other fiber sources — how they're grown, harvested, stored, plus how to recognize quality — is an important part of your everyday management. So, too, is knowing which fiber sources are appropriate for your horse.

Forage can be loosely defined as any feed made up of the stems, leaves, and stalks of plants and which has a minimum fiber content of 18% and a relatively low dietary energy (DE) content. The most natural, least expensive, and safest feed for horses, forage provides the bulk of nutrients horses require for their everyday maintenance metabolism and stimulates the muscle tone and the activity of the gastrointestinal tract. Horses with inadequate amounts of forage in their diets run the risk of colicking or developing painful gastric ulcers, as well as stable vices derived from having too little to chew on.

Although horses have been known to nibble on tree leaves and branches, they're primarily grazers, not browsers like deer, and grasses make up most of their natural diet. If you live in a temperate climate with no chance of drought, your horses might have the luxury of nutritious grazing — fresh forage — year-round. But for most North Americans, there's a portion of the year when good pasture is just not available, and hay — grasses and/or legumes that have been sun-cured, dried, and baled

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Grains

It's 5 p.m., and up and down the aisle of a large boarding stable, the nickering, rumbling, and pawing begin. What's the cause of the excitement? Nothing more than a metal scoop digging into a bin of grain, a sound that tips off every equine resident that it's dinnertime. Hay seldom receives this sort of reception; it's grain that horses really relish.

But just because horses love grain doesn't mean it's an essential part of their diet. In a wild state, they encounter grain only as an occasional plant seedhead — certainly never in the volumes found in their feed buckets in a domestic scenario. While their teeth can grind grain seeds quite efficiently, their digestive systems are poorly equipped to deal with the low-fiber, high-carbohydrate wallop that grain delivers, thus the much higher incidence of colic among grain-fed horses compared with those fed only forages.

As most of us know, the intake of an excess quantity of any type of grain can result in dire consequences, including life-threatening colic and founder. Unfortunately, equines have no dietary wisdom when it comes to grain, and given the opportunity to gorge themselves (if, for instance, the feed room door is left open), they can conceivably eat themselves to death. Because of this, grain should never be fed free-choice or left so that it is accessible to horses outside of their allotted amount at mealtimes. And except in some very exceptional circumstances (largely, horses in hard race training), the grain portion should never be more than 50%, by weight, of a horse's total daily ration. It need not be fed at all, in fact, unless you wish to supplement the energy or nutrient demands of your

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Ration Balancing & Body Condition

Here's where we put it all together. It's time to take all the information from our preceding chapters and formulate some balanced diets for our horses. At this point most people freeze in fear!

Relax. It's true there are all sorts of complicated calculations you can do to determine optimum levels of every essential nutrient, but it's also true that 90% of the time, you don't need to perform any convoluted math to ensure your equines' good health. Your horse will tell you if he's receiving good nutrition — by his shiny coat, good appetite, pleasant outlook, and appropriate energy level. If you are feeding average-to-excellent-quality forage and grain, you can be reasonably assured that your horse's diet will meet his daily nutrient requirements. This is nearly always the case when you feed a commercial ration without supplements; only during growth (especially in the first year), lactation, and the last three months of pregnancy are horses likely to need extra nutritional support. Supplementing also might be necessary if the forage you're feeding is of poor quality (assuming, of course, that you're unable to replace it with something better).

It's worth noting, however, that contrary to popular belief, horses do not have "nutritional wisdom" when it comes to their diets. Some marketing pros would have you believe that horses instinctively choose the plants and nutrients they need for good health. Alas, that's not the case — if it were true, we would never have a problem with horses gorging themselves with grain until they colic. With the exception of salt and water, horses do not develop cravings for the nutrients they require; they simply function

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Weight Management

As introduced in Chapter 1, body condition, adiposity, and weight can affect a horse's overall health status. In this chapter we'll identify some of the specific health concerns for horses that are too thin (emaciated) or too fat (obese). Then, we'll discuss ways to help your horse gain or lose weight.

Concerns With Emaciation

The biggest concern with emaciation is overall undernutrition. In general, a truly emaciated or underconditioned horse (BCS less than 3) isn't consuming enough nutrients. This could be because the horse isn't consuming enough feed altogether, or it is consuming feed that has a low nutritional profile. Therefore, in addition to consuming too few calories, the horse might also be deficient in protein, vitamins, and minerals or has a condition making it difficult to utilize its feed, resulting in an unhealthy situation. While no studies of horses have examined the effects of limiting energy intake (while meeting other requirements) on long-term health, in other species it is well-accepted that reduced energy intake resulting in a lean body type (approximate equivalent of a BCS of 4) is beneficial to overall health. With respect to horses, however, the general population interprets a lean animal as malnourished, and the incident can be highly scrutinized.

With emaciation — even if protein, vitamin, and mineral requirements are being met — the concern is the horse not having enough energy reserves in the form of caloric intake to function normally. Obviously,

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Digestive and Diet-Related Disorders

We are what we eat! This hits home when we examine the broad range of diseases and disorders linked to nutrition. Some of the conditions outlined in this chapter are caused by nutritional imbalances; others have their root cause elsewhere but can be addressed with specialized nutrition.

Developmental Orthopedic Disease

Developmental orthopedic disease (DOD) is a catchall phrase for related syndromes contributing to poor skeletal development in foals: angular limb deformities, osteochondrosis, osteochondritis dissecans (OCD), contracted tendons, cervical malformations, subchondral bone cysts, club foot, and physitis among them.

Physitis is an inflammation of the growth plates in a growing foal's long bones. (Physitis was formerly known as epiphysitis — but the epiphysis is the site of secondary ossification in a bone, while the physis is the actual growth plate.) Osteochondrosis is a process in which cartilage at the ends of long bones are not replaced by bone in the normal manner as a foal grows. The result is thickened, abnormal cartilage, which can separate from the bone and act as an irritant in the joint capsule, causing pain and lameness. Other forms of DOD are variations on the theme of abnormal bone growth in youngsters, and while nutrition doesn't provide all the answers, it does play a role in prevention. Nutritional excesses or imbalances can lead to rapid growth spurts in foals, which have been linked to high incidences of osteochondrosis and physitis — especially in the crucial