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# Teach Your Horse Trot Lengthenings

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# BRING BIGGER STEPS Two methods for teaching your horse to lengthen his trot stride without breaking into canter

### By Bruno Greber 🔳 Photos by Amy K. Dragoo

oes your horse struggle with trot lengthenings? Does he quicken his tempo or break into canter instead of taking bigger steps? Not all horses are gifted with natural, balanced trot lengthenings. But every horse can learn to produce them, to a certain degree, given thoughtful

training, clear, consistent use of the leg aids and patience.

One of the first lessons we teach horses is that "leg means go," which they initially interpret to mean: "Move your feet!" In the next stage of training, we ask them to engage their hind legs—to flex their stifles and hocks more so their hind legs step farther underneath their bellies. This enables them to push off more energetically and take bigger steps without speeding up the tempo. To learn how to do this on cue, your horse needs to understand the leg aids that speak directly to his hind legs. In this article, I'll explain two approaches that I have found effective over the years in teaching horses to make this association. The first will show your horse how to yield sideways to leg pressure before asking for any steps of lengthening. This improves his acceptance and understanding of the leg aids and also increases the mobility of his shoulders and engagement of his hindquarters. The second approach uses ground poles to encourage him to gradually lengthen his stride without losing his balance.

Before attempting either method, make a training game plan for your horse. It probably will take him many sessions to grasp the concept of moving forward without getting faster. As with other new lessons, the best way to instill this in him without creating resistance or tension is by breaking it down into small, easy steps. Be sure he understands each step and is happy and relaxed doing it before you advance to the next one.

Plan to work on these exercises about three times a week. Limit how much time you spend on each one, being sure

#### Any horse's trot lengthenings, no matter how rushed or imbalanced they may be initially, can be improved with exercises designed to increase his engagement, range of motion and responsiveness to the rider's aids.



# Exercise I, Step I: Turn on the Forehand



1. I begin by teaching Lindau, a Holsteiner gelding, how to respond to a lateral leg aid. Standing next to his left shoulder with the reins over his neck, I take a feel of the left rein to bring his nose toward me. I press my thumb between his ribs just behind the girth, where my leg would be if I were mounted. He then steps his hind legs away from me, moving his hindquarters around his front legs.

to integrate it into the other things you regularly practice. Watch that you never overdo it. Imagine hiring a trainer at a gym who works you to the point of exhaustion every time you work with him. After a few sessions, you'll probably start making excuses not to go back. Your horse is just the same. Keep the sessions pleasant and doable so he looks forward to coming back to the ring the next time.

### Exercise 1, Step 1: Turn on the Forehand

To introduce the concept of moving the hind feet in response to pressure from a single leg, teach your horse the turn on the forehand. In this exercise, he'll step sideways with his hind legs, pivoting his body around his forelegs. Horses usually pick this up very quickly if you first show them how to do it unmounted. Here's how:

After tacking up your horse, lead him into the middle of the arena and stand beside his left shoulder with his reins

over his neck and the left one in your left hand. Gently take a feel of the left rein to bring his nose slightly to the left. Then press your thumb between his ribs just behind the girth. This will encourage him to disengage his hindquarters and step sideways away from you (to the right). The moment he does this, immediately release the thumb pressure and praise him.

If your horse doesn't step sideways, try applying the pressure with the handle end of a whip. Also experiment with where you place your thumb or whip to see what location elicits the best response. He may be more likely to activate his hind legs if you move the cue a few inches back.

Ask for just one sideways step at a time, pausing to reward him after each step. After he takes two or three good steps, walk around to his other shoulder and ask him to do the same thing in the other direction. Depending on how quickly he digests this lesson, you may want to repeat this over several sessions before moving on to the next lesson.



2. Once this lesson is clear, I mount and apply the same rein and leg aids from the saddle. To reinforce them, I ask my wife, Barbara, to press her thumb between Lindau's ribs in the same way I did earlier. He makes the connection easily and moves his hind legs obediently sideways in response to our combined aids. After a little practice, I can ask him to perform these turns on the forehand without the help of a ground person.

You will need a ground person for the next step. With you mounted, ask her to stand by his left shoulder just as you did in the previous lesson. While holding normal rein contact to keep your horse from stepping forward, flex his nose slightly to the left with your left rein. Then apply left leg pressure in the same place where you used your thumb before. The moment he steps sideways, relax your leg and praise him. If he doesn't step sideways, ask your ground person to press him between the ribs with her thumb just as you did before.

Repeat the same process in the other direction. With repetition, he'll eventually begin to understand what your leg aid means. Ask for one step with each squeeze of your leg so that he learns to synchronize the movement of his hind legs with your leg aids. Once he's responding well, progress to doing the same exercise without your ground person. Your goal is to be able to apply the leg aid without needing the rein aid to keep your horse from leaving the spot with his front legs.

## Exercise I, Step 2: Forward and Sideways



1. To begin the forward–sideways exercise, I turn down the quarterline and walk straight for several strides, checking that Lindau is moving forward in a relaxed, happy manner.

### Exercise 1, Step 2: Forward and Sideways

Now it's time to add a forward component to this sideways concept. We're going to introduce an easy leg-yield on a very shallow diagonal from the quarterline to the outer rail or wall of the arena. Horses find moving in this direction, from the inside to the outside of the ring, very inviting. The shallow diagonal also will help you avoid pressuring your horse to do too much too soon.

This is not going to be a textbook First Level leg-yield, which would be too much to ask of a young/green horse at this point. Instead, you're going to ask him simply to move forward and slightly sideways in response to your leg aids without worrying too much about how straight he is in his body, how much his legs cross over or what his frame looks like.

Start at the walk and turn down the quarterline. So, for example, if you're tracking right, walk past A, then turn down the next quarterline. Go straight for several steps, then flex and bend your horse slightly to the right. This mild bend away from the direction of travel is more inviting and less demanding than a "final product" leg-yield, which technically should have no bend.

2. Next, I use my inside rein to flex him

slightly to the right before applying my

inside (right) leg gid to ask him to drift

sideways toward the left side of the arena.

Next, apply the same right leg aid you used to ask for the turn on the forehand, squeezing and releasing your leg in rhythm with his walk steps. He should continue moving forward but also step slightly to the left, away from your aid. As with the turn on the forehand, your inside leg will do all the talking. Think of "breathing" with it, increasing and decreasing the leg pressure for each step. Meanwhile, your outside leg should be passive, resting quietly against your horse's side and allowing the sideways steps.

When necessary, make half-halts with your outside hand (your left hand in this example) to rebalance him if his tempo quickens or his shoulder bulges to the outside. Do this by squeezing and releasing your hand on the rein as if you were



3. After several sideways steps, I ask him to walk straight again for a few strides, giving him a chance to relax while also reinforcing the forward component of the exercise. We continue this staircase pattern of travel on the shallow diagonal until we reach the edge of the arena.

squeezing water out of a sponge. As with your leg aid, time your half-halts in rhythm with your horse's steps, without taking a firm hold on his mouth. The goal is to introduce your horse to very understandable aids without making him feel boxed in and tense. If his response does not match your expectations—for example, if he speeds up—gently remind him with a halfhalt, "I don't need you to rush." Then give him time to figure out a better interpretation of your leg aid.

Ask for only two or three of these sideways steps, still thinking of creating one sideways step with each leg squeeze, before walking straight forward again parallel to the wall. Repeat this sideways–forward cycle several times, working your way toward H in a staircase-like fashion.

Practice this a few times in both directions and then call it a day. Over the course of several subsequent sessions, gradually ask for more sideways steps, say four or five at a time, in between the straight steps.

# Exercise 1, Step 2: Leg-yield at the Trot



1. Once Lindau understands the forward-and-sideways exercise at the walk, I introduce it at the trot. We turn down the quarterline again, heading across the short diagonal in the same staircase fashion, taking a few straight, forward steps, then a few steps sideways (note the crossover in his hind legs) ...



2. ... and then more forward, straight steps. You can tell by Lindau's ears that he is concentrating. The leg-yield steps create more engagement in his hindquarters, which allows him to step farther underneath his body with his hind legs. I continue to post so his back stays supple, allowing the energy to flow over his topline. If I threw away the contact at this point, we'd lose all of this great energy and his balance would fall onto his forehand.

Remember that the goal is to encourage your horse to take bigger steps with his hind legs, comfortably and confidently, in response to your leg aid. As his understanding progresses, you can increase the number of lateral steps, but always follow the same shallow diagonal. Avoid asking for more extreme lateral movement that would get you to the rail sooner.

You can also vary the placement of your leg aids to activate the shoulders and hindquarters in different ways. Sometimes place your leg a little farther behind the girth to talk to his hindquarters, allowing them to lead the shoulders in the sideways travel. Other times, place your leg more forward, closer to his elbow, to talk to his shoulders, allowing them to lead the hindquarters. Now and then, look for the happy medium that results in him moving sideways with all four legs with his body relatively parallel to the wall. These variations will encourage him to explore using his body in different ways, much like putting the pieces of a puzzle together.

When he is doing this exercise happily at the walk, repeat the same thing at the

trot. Check that your position stays balanced, with your shoulders over your hips and your hips over your ankles. Stay in rising trot as this tends to put horses at ease. It also will help you apply your leg aid in a natural, rhythmic, pressure-release fashion, closing against his side when you sit and softening when you rise. You won't be tempted to apply a strong, constant leg pressure, which might provoke a negative reaction in your horse.

### Exercise 1, Step 3: Create Bigger Steps

Once the shallow, staircase leg-yield is going well at the trot, you're ready to introduce a few lengthened steps. Begin on the quarterline, just as you did before. Initiate the same slight leg-yield, allowing the shoulders to lead toward the wall. This time, though, after his shoulders drift slightly sideways, each time you apply and release your inside leg aid in rhythm with his trot, squeeze it for a split second longer than you did before. This slightly prolonged leg aid will encourage him to add a little air time to his steps, increasing his suspension and stride length. Also, because the slight lateral movement freed up his shoulders, his forelegs will be mobilized to stretch forward to cover more ground, thus creating space for his hind legs to step farther underneath his belly.

At this point, it's very important that you maintain your own balance so you don't risk throwing *him* off balance. Don't tip your body forward. Instead, maintain the steady posting rhythm—think *bigger*, not *faster*—and imagine a glass wall extending up vertically from your horse's withers. Try to keep your nose from touching that imaginary barrier.

Be sure to maintain a steady contact. Many riders try too hard to stay out of their horses' faces, afraid to touch the reins. Without that connection, though, their horses are more likely to fall into a fast trot or break into canter. By keeping a light contact, you encourage your horse to stretch his nose forward onto the bit, thus connecting the energy from his hindquarters over his back, withers and poll. This helps him create more push in his hind legs and thus longer trot steps.

# Exercise I, Step 3: Create Bigger Steps



1. Once the idea of moving sideways away from a single leg aid is clear, I teach Lindau the next concept, which is to take bigger steps forward in response to both leg aids used together. With the nice engagement we created in the previous exercise (note how well his hind leg is stepping underneath his body here), we turn down the quarterline and head across the short diagonal, straight toward the rail, for several strides.



2. Next, I ask for a slight bend to the right while applying an inside (right) leg aid in rhythm with Lindau's trot stride to ask for a few steps of leg-yield. You can see the increased flexion in his stifle and hock as he steps sideways with his hind leg as well as the improved range of motion in his shoulder as he reaches forward and sideways with his front leg.



3. Now when I straighten Lindau and apply both legs simultaneously, he has much more power to produce a few steps of trot lengthening.

Reward your horse for any effort he makes, no matter how small. Then take time to build on the concept. Eventually, when he feels relaxed and confident, you will be able to skip the bend and sideways drift and instead ride a single track straight to a specific arena letter or spot you've chosen. This time, apply the bigger-step leg aid with both legs—still in rhythm with his trot. Again, ask for a few steps at first and then gradually build on that. Over time, you will be able to perform a finalproduct lengthening from start to finish across the diagonal.

### Exercise 2: Ground Poles

Another way to teach your horse to lengthen his stride is with ground poles. Start with a single pole on the ground. Walk him over the center of it several times in a calm, relaxed manner. Then go over it in posting trot, keeping a light contact with his mouth and maintaining your own upright position and steady balance. Be sure your shoulders remain aligned over your hips and ankles. Don't do anything differently with your legs unless he slows down, in which case apply the same leg aids you would if he fell behind the pace doing anything else.

Next, with the help of a ground person if necessary, measure your horse's natural trot stride by looking at his footprints in the sand. Measure from one pair of prints (made by one forefoot and one hind foot) to the next. Set up three parallel ground poles spaced this same distance apart. The average horse's trot stride is about 4 feet (120 centimeters) long, but if your horse's stride is shorter than average, it's important to adjust the poles accordingly to

## **Exercise 2: Ground Poles**



1. Another great way to encourage bigger trot steps in response to your leg aids is with ground poles. I first walk and then trot Lindau over three poles. My ground person helps me adjust the spacing of the poles to match his natural trot stride so that he can step comfortably over them without altering his rhythm. As we trot over the poles, I continue posting to allow him to swing through his back and follow his mouth with soft hands so that he can stretch his topline forward and down.



2. Gradually my ground person increases the spacing between the poles, one inch at a time. Each time, I add a little more pressure to my leg aids, squeezing and releasing them in rhythm with Lindau's trot. This reinforces the concept that the poles are teaching him to take bigger steps. Because he has maintained his lovely rhythm, balance and relaxation, we widen the spacing to the point where he is producing significantly longer strides. Over time, I will be able to ask him for trot lengthenings like this without poles, simply by applying the same clear, logical aids he learned in this lesson.

make him comfortable with the exercise without risking throwing him off balance or confusing him.

Ride through the center of the three poles at a rising trot, keeping a soft contact with his mouth and maintaining an upright, balanced position. Close your legs against his sides each time you sit, giving rhythmic pressure–release support to help him associate this leg aid with the greater effort he needs to clear the poles. Repeat this several times in both directions.

When your horse is absolutely comfortable and relaxed going over the poles in his natural stride, gradually increase the space between the poles by only an inch or two each time. As you ride through the slightly wider-spaced poles, prolong each leg squeeze a split second longer to teach your horse to associate it with the bigger step.

Continue to increase the spacing gradually. Build him up in a way that makes sense to him and doesn't ever become stressful, which would make the exercise counterproductive. Increasing the spacing too suddenly could result in a serious loss of confidence. Never spread the poles to a point where he starts to lose his balance or where you have to ride extremely aggressively to get him through the exercise.

For the first several sessions, begin with the spacing that matches his natural stride so he starts in his comfort zone. To save time, you can set up two sets of poles: one at his comfortable distance and the other with slightly wider spacing. Eventually, as his strength and confidence improve, you may be able to begin the sessions with the wider-spaced poles.

How widely you ultimately space the poles for your horse is not as important as teaching him to stay relaxed and confident while adjusting his stride. With practice, he'll learn to do the same thing in response to your leg aids without the poles. To reinforce this lesson—and make his routine more interesting—alternate these ground-pole sessions on some days with the leg-yield sessions on other days. This will help you achieve your goal of consistent, quality trot lengthenings more easily and quickly. **3** 

A native of Switzerland, **Bruno Greber** earned his Eid. dipl. Reitlehrer (master instructor) diploma through the Swiss Professional Rider's Association's trainer/instructor program. He then moved to Vienna, Austria, to specialize in classical dressage. There he studied with former first chief rider of the Spanish Riding School Arthur Kottas-Heldenberg as his assistant trainer at his private barn. Bruno has also trained with Georg Wahl, Egon von Neindorff, George Theodorescu, Klaus Krzisch, Philippe Karl, Linda Tellington-Jones and Lisa Wilcox. He has taught clinics around the world for many years. He moved to Gordonsville, Virginia, in 2003 to compete horses for Ashanti Farm. During the following 11 years, he earned his U.S. Dressage Federation bronze, silver and gold medals. In 2014, Bruno and his wife, Barbara, started their own training business in White Hall, Virginia. For more information, go to greberdressage.com.

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# Is your horse getting the right amount and type of the body's building blocks to be healthy and perform his best?

### **By Elizabeth Iliff Prax**

mino acids are a hot topic in today's equine nutrition. They are the vital biological building blocks that link together in the horse's body to create proteins, which form everything from muscle tissue to organ tissue as well as enzymes, hormones and antibodies. "Aside from water, protein is the most abundant molecule in the body," says Middle Tennessee State University associate professor Holly Spooner, PhD. "All

tissue is made from protein. But it is perhaps the most misunderstood essential nutrient."

Horse owners tend to focus on crude protein, which, she explains, is actually just an estimate of the amount of protein in a feed product based on how much nitrogen is present (since nitrogen is much more abundant in protein than in other nutrients). "But that doesn't exactly tell the whole story," Dr. Spooner says. Quality matters more than quantity when it comes to protein in your horse's diet—and quality is determined, in part, by which amino acids are present in his food.

All grasses, grains and hays have a certain amount of protein in them. When it arrives in your horse's stomach and small intestine, enzymes break it down into its amino-acid components. His body then puts these building blocks together in new configurations to make whatever it needs at the moment—for example, new tissue for muscles or vital organs.

Horses, like all mammals, use only about 22 of the more than 500 amino acids that exist on earth. Their bodies manufacture 12 of those 22, so we need to provide the other 10 "essential" amino acids through food: lysine, methionine, arginine, histidine, phenylalanine, threonine, tryptophan, valine, leucine and isoleucine.

Each protein a horse's body makes has a unique code, a formula dictating how a specific sequence of amino acids should be strung together. Some proteins consist of

just a few amino acids; others are chains of thousands. If one amino acid in a particular protein's formula isn't available, the body can't substitute it with a different amino acid, so that protein can't be made.

"It's like putting together Legos<sup>®</sup>," Dr. Spooner says. "The individual blocks are like amino acids. If your plan calls for six red Lego blocks and you don't have six red Legos, you can't keep building. It doesn't matter that you have 150 blue Legos or 200 green Legos."

In this scenario, the red Lego represents what is known as a "limiting amino acid." How much you have of it limits how much protein you can build. In horses, scientists know that lysine is the most important limiting amino acid. They've estimated how much lysine horses need in their diets, but there is very little research about how much of each of the other amino acids they require. This is because horses are more labor-intensive to study and the benefits are harder to define than in other species, such as pigs and chickens.

While we wait for equine science to catch up, much of what we do know comes from human-nutrition research. For example, as with humans, although amino acids play many different roles in the horse's body, their primary purpose is to build protein. "Anything beyond that is going to be a relatively small portion of that amino acid," says University of Kentucky associate professor



**ABOVE:** Muscle proteins are constantly being broken down and remade, especially during exercise. Coupling your horse's training regimen with a goodquality protein source is the best way to help his body synthesize new protein, in turn creating more muscle.

**TOP RIGHT:** Though protein deficiency is uncommon, some signs that your horse might have this issue include weight loss and poor hair and hoof growth.

**LOWER RIGHT:** Lactating mares need more protein in their diets because they're supporting the protein needs of their growing foals as well as their own.

of equine science Kristine Urschel, PhD. "People get bogged down with some of the special uses for amino acids—such as tryptophan having a calming effect—when, first and foremost, amino acids are used to make protein."

### How to Make More Muscle

So let's focus on protein—more specifically, muscle protein. Muscle is about 70 percent water and 20 percent protein. The other 10 percent includes fat, vitamins, minerals and glycogen (the muscle's main energy source). The size of a muscle is largely determined by how much protein it contains. And this, it turns out, is a more fluid system than you might realize. Dr. Urschel explains, "It's not that a muscle protein gets made and then stays there forever. It's constantly in the process of being broken





down and then remade, which allows the animal to be able to adapt to changing conditions." For example, if a horse has a chronic disease, he may need to repurpose some of his muscle protein for a different function in the immune system to battle the disease.

When a horse exercises, that exertion causes some of his muscle protein to break

down. His body then replaces and adds to that muscle by synthesizing new protein. But building bigger, better muscles isn't just a matter of feeding your horse plenty of amino acids, says Dr. Urschel. "That's like a human bodybuilder who thinks he can sit all day eating steak and get lots of big muscles. You're not going to get, say, the performance-level dressage horse topline if those muscles are never exercised to stimulate them." Building new muscle, she says, requires a combination of high-quality protein and a good exercise program, which stimulates protein synthesis at a cellular level. "Neither one can do it on its own."

### **How Much is Enough?**

Each individual horse's protein requirements depend on how much new protein his body needs to make. If he is growing, he'll obviously need plenty of protein to build new tissue throughout his body. If he is exercising strenuously, he'll need new protein to replace and add to the brokendown proteins in his muscles. He'll also need to replace the proteins and amino acids that he loses through sweat and will need extra protein to maintain the larger lean body mass that results from all this exercise.

The National Research Council's publication "Nutrient Requirements of Horses" lists the minimum amount of crude protein horses need at different stages of life. It also recommends a minimum amount of lysine for each case.

You can plug different body weights, ages and occupations (broodmare, working horse, etc.) into the NRC's handy online calculator to find your horse's exact requirements. For example, it says that a 1,100-pound adult horse in moderate work (exercising four to five hours a week) requires 768 grams of daily protein, 33 of which should be lysine. To learn how to translate these amounts into your horse's daily hay and grain rations, consult your local extension agent or check out the resources in the sidebar, "Where Can I Learn More?" on page 13.

What happens if your horse *doesn't* get all the amino acids he needs? Common signs include weight loss, poor hair and hoof growth, retarded growth in youngsters and lost fetuses and decreased milk production in broodmares. "But these conditions are rather uncommon in a horse with a normal weight receiving adequate feed intake," says Dr. Spooner. "In the U.S., we more commonly see protein being fed in excess than we see protein deficiencies, except maybe in the case of young, growing horses." In fact, she says, most adult horses on a maintenance regimen (doing minimal or no exercise) get all the protein they need from forage-grass and hay-alone.

The horses who need the most extra protein are lactating mares, who are helping their babies grow new tissue while

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	Guaranteed Analysis	
	Crude Protein (Min.)	
	Lysine (Min.)	0.9%
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A Contract of the	Crude Fiber (Max.)	1270
	Calcium (Min.)	
	Calcium (Max.)	0.8%
	Phosphorus (Min.)	1.3%
	Potassium (Min.)	
	Copper (Min.)	1.0%
	Scientium (Min)	
	Zine (Min.)	0.6 ppm
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	Boctin (Min.)	160 110110
1	Omega 6 Fatty Acids (Min.)	10010/16
	Omega 3 Fatty Acids (Min.)	3.0 mg/lb
	Saccharonayces cervisine Yeart Culture a C	
	Direct-Fed Microorganisms (Min.)	1.00%
	(Seccharomyces convisies, Lastobard)	
	bucillas lichenformis, Bacillas acidophilus, Lactobacillas	
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	Actuicatiulase (Asperpillus Man.)	12 Englishe Units
	Pavlase (Trick - 4 Pavlas Niger) (Min )	Linzyme Unite

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Even if you see common free forms of amino acids, such as lysine, threonine and methionine, on a grain bag label's guaranteed analysis, it doesn't mean they are in their most digestible form.

supporting their own bodies' protein needs. The next protein-needy horses are weanlings, yearlings and horses in heavy exercise. However, even horses in intense training, like racehorses and upper-level three-day event horses, need far less protein than lactating mares. In fact, because their diets are generally so calorie-dense to meet their higher energy needs, performance horses typically get more protein than necessary.

### How to Interpret Feed Labels

In general, both our experts agree that most horses get all the protein they need from a combination of good-quality forage and a suitable amount of concentrate designed for their age and lifestyle. However, says Dr. Spooner, the crude protein percentage you see on a feed label "really isn't what we should be focusing our attention on. All proteins are not created equal. If we're meeting the horse's protein requirement with poor-quality protein in terms of the amino-acid profile, we could still have a horse who is unable to build the protein that he needs."

So what is good-quality protein? In forage, it usually means immature, leafy hay rather than old, stemmy hay. Grass hays are generally between about 6 and 10 percent protein, whereas legume hays, like alfalfa and clover, can be 15 percent or higher. Whatever hay you're feeding, Dr. Spooner highly recommends having samples of it tested "because it can be very deceiving. For instance, we have a relatively immature prairie-grass hay here at the university that often comes in with a protein level of 4 to 6 percent, which is pretty low compared to what most people might expect."

To further complicate things, researchers have learned that horses' bodies can't actually access all the protein they receive in forage. That's because the

plants' thick cell walls—the fiber—can't be broken down until the forage arrives in the large intestine, also known as the hindgut. But the enzymes in charge of breaking proteins down into amino acids are located in the foregut: the stomach and small intestine. So, theoretically, by the time the protein from forage is accessible, it may be too late for the body to actually use it. Concentrates, on the other hand, have less fiber, so are more easily digested in the foregut.

"This is another area of research that is super exciting," says Dr. Urschel. "There's still a ton that we need to know about it. We know that wild horses have been able to survive and reproduce on almost exclusive forage-type diets. So it's a bit of a conundrum. I think horses can get at least some amino acids from a good-quality forage, but the lower the fiber in the food, the more digestible in the foregut the protein is." Having said that, though, she is quick to add, "I still strongly believe that forage should be the backbone of most diets."

The protein quality in concentrates also depends on the source. For example, cereal grains, such as oats and corn, tend to be low in lysine, whereas legumes and oil seeds, such as soybean meal, have higher lysine levels. Commercial feed companies often add purified forms of amino acids directly to their products to ensure that they reach adequate levels. These are more digestible because they're already in free amino-acid form. However, Dr. Urschel says, read feed labels carefully. "If you see, say, leucine included in the guaranteed analysis, but not in the ingredient list, all they've essentially told you is that leucine was contained in the grains. They haven't added any additional leucine to it. If it's in free form, it will be listed separately as an ingredient."

The four most common free forms of amino acids that you'll see in an ingredient list are L-lysine, L-threonine, L-tryptophan and DL-methionine. Unfortunately, until more research is conducted, scientists still don't know what horses' exact requirements are for each of these amino acids. They do believe, however, that these free forms are the easiest for horses' bodies to access in their digestive tracts.

Another way to make the amino acids in your horse's diet more bioavailable is to limit the size of his meals. "Horses often have greater digestibilities when a more reasonable amount of concentrate is fed at any given time," says Dr. Spooner. She recommends keeping concentrate meals at or below about 0.5 percent of your horse's body weight (so about 5½ pounds of food for a 1,100-pound horse per meal).

### Too Much of a Good Thing

Until we know exactly how much our horses need of each amino acid, why don't we just give them lots of each? Because the body can't store amino acids to use later the way it stores carbohydrates and fat. "The body doesn't store extra protein as muscle," says Dr. Urschel. Instead, she explains, the liver converts the amino acids that aren't used immediately into a compound called urea, which is then passed on to the kidneys where it's filtered and excreted in the urine.

This process requires energy and other additional resources, such as water. The horse's body can use protein to produce energy as well, but, as Dr. Spooner says, this is "metabolically expensive. It's not the easiest way for the horse to make energy." Because it's much easier



Researchers have recently discovered that horses have a special protein in their sweat called latherin, which forms the white lather on their coats when they exercise strenuously. This keeps the sweat on the horse's hair, rather than dripping off, and allows him to cool more effectively.

to produce energy from carbohydrates and fats, excess protein usually goes unused and thus must be eliminated from the body. This forces the liver and kidneys to work harder as they have to break down and process the protein. "If you've ever known anyone who's done the llow-carbl Atkins Diet, what they're doing is utilizing protein (and fat) for energy. It's been known to make people grumpy and they don't feel well, especially if they try to exercise.

"Excess protein may also hinder performance in the horse," she continues. "It contributes to what we call acidosis—a lowering of the pH within the horse's body—which causes him to fatigue faster and not have as good a performance." Consequently, in recent years, equine nutritionists have begun recommending that performance horses be fed a lower percentage of dietary protein to avoid the protein excesses that often accompany the extra calories they consume.

The acidotic state caused by excess protein can also influence how much calcium is absorbed into the gut of young, growing horses. Researchers believe this might compromise bone growth.

Protein is one of the most expensive

### Where can I learn more?

To learn more about how amino acids function in your horse's body and how you can develop the most precise feeding program possible for him, check out these links:

- National Research Council 2007 online nutrition calculator nrc88.nas.edu/nrh/
- The Cooperative Extension System horses.extension.org
- "Protein Requirements for Horses" webinar by Dr. Holly Spooner youtube.com/watch?v=i-G\_W9zHAbg
- My Horse University Equine Nutrition Course myhorseuniversity.com/nutrition

ingredients in horse feeds, so feeding your horse extra protein is an unnecessary drain on your budget. Because of its high nitrogen content, it's also a potential environmental pollutant, not just to nearby land and water but to your horse's immediate surroundings. When horses excrete excess protein, it produces ammonia gas—the strong smell we all associate with dirty stalls—which, in large quantities, can impact your horse's respiratory system.

#### **Precision Feeding**

So how can you provide the benefits of amino acids without risking these downsides? "There's a push toward what's called precision horse feeding, doing a better job of *just* meeting the requirements, as opposed to throwing the kitchen sink at them," says Dr. Spooner.

Although the NRC doesn't yet offer comprehensive amino-acid profiles in its feeding guidelines, researchers continue to study horses' specific dietary requirements. For example, a recent study found that the amino-acid concentrations in horses' sweat are different from those in their bloodstreams. They also have a special protein in their sweat that humans don't have, called latherin, which forms the white lather you see on their coats when they exercise strenuously. This plays an important role in keeping the sweat on the horse's hair, rather than dripping off his body, thus allowing it to most effectively cool him via evaporation.

The researchers of this study developed a feed supplement to address the unique

amino-acid concentrations they'd measured in horses' sweat. Their results are still preliminary, but anecdotal evidence looks promising. Since horses lose significantly more amino acids through sweat than humans do, this is one area where equine-specific studies will be invaluable.

While the science evolves, both of our experts caution horse owners to be wary of commercial products' claims that aren't substantiated with widely published, impartially obtained data. For example, says Dr. Spooner, "There's a fairly common belief that horses that look poor in their toplines can benefit from amino-acid supplements. But you have to go back and say, 'Well, what else is being done? Did you put that horse into work? Did you suddenly feed him more in general and maybe what he really needed was just more energy?' I think the jury's still out on that to some extent."

Until we have better science, our experts agree, there's no harm in experimenting with commercial amino-acid products, for example, with a horse who appears to be receiving an adequate number of calories and the correct type of training to build a good topline but still isn't doing so. If you decide to supplement your horse's diet with one of these top dressings, Dr. Urschel recommends following the portion guidelines closely and giving it at least a two-month trial. If you don't notice an obvious change after two months, your horse was likely already receiving all the amino acids he needed in his regular diet. 3

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