

Photo taken at the 2010 Prairie Smoke Ride
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Distance conditioning for your new horse

BY TERRE O'BRENNAN

There are professionally-developed, safe and effective programs available that are designed to train a human "couch potato" to the level of completing a 10k run.

EDUCATION UPDATE

Principles of conditioning being somewhat universal, I believe these programs can be adapted to train an equine "pasture potato" to the level of completing an LD ride,

since these principles are similar between horses and humans. Of course there are some important differences that should be remembered.

This program is designed to achieve the requisite level of fitness in 13 weeks—approximately three months.

Many owners believe that their average pasture horse is fit enough to take right out of the pasture and then complete a limited distance ride. While this is true of some horses it is also untrue of others. Often horses lack the very basics of fitness and even moderately fit horses may be unready to take on the particular challenges of a LD ride. Remember that riding away from home in company of other horses on unfamiliar trail is very different than even good training rides at home.

All of these factors should be addressed when conditioning a horse for even a slow LD. It is important to note that there is *no* "speed component" involved; this program is simply about distance covered or time spent exercising; it will get your horse out on trail and hopefully completing a *slow* LD. Any attempt at speed over the course is beyond the scope of this conditioning program and could possibly be placing the horse in danger.

Recovery and adaption

In brief, each week includes three sessions. It is obviously better to work on alternate days, with an additional day off

sometime in the week.

In each week, of the three sessions, the first workout is the hardest, the second is the easiest, the third is moderate—midway between the two. The progression is therefore: hard work > day off > mild work (recovery) > day off > moderate work > day off. This leads to a harder workout that is the first day of the next three sessions.

Individuals should to modify the program to their own unique situation.

This pattern allows for recovery and adaptation while steadily increasing the workload by stages. All body systems adapt and get stronger or become conditioned by a process of stress, recovery and rebuilding. Whether it is the cardiovascular system, the musculoskeletal system or specific ligaments or tendons, they all improve by being worked to the point of low-level stress, then being allowed to recover and rebuild. This cycle produces more muscle, stronger tendons and ligaments and more productive blood flow and heart activity.

A "workout" and "rest" program is crucial to this system of conditioning. By varying the work at each session, the individual can keep training and developing without serious problems of fatigue or injury.

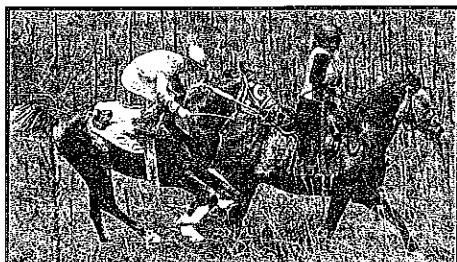
Every fourth week is an "easy week" where the work returns to a lower level of either effort or duration. This, again, allows for recovery and adaptation.

The 13th week culminates in the actual event for which you have been training.

What to watch

Always, the legs must be examined after each workout for signs of injury, and the horse's body weight and attitude assessed as the program proceeds.

Be aware of terrain as well. Trotting in soft sand is harder and requires more physiological effort than trotting on smooth grass. One should always incorporate training on the type of terrain that you will be competing on but this variation can also cause problems with the evaluation of progress. A note about specificity: if at all possible, try to do at least a little bit of training in the same type of terrain you will be competing in. If the ride is in the mountains, try to train on steep grades at least a few times. If you anticipate sand or mud; try to find some to condition in.



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A sample program

And don't forget the "mental" aspects of the sport—quietly standing for vet inspections, tying to the trailer or living in pens or electric corrals, sharing the trail with other horses, eating and drinking on the trail. The horse needs to be prepared for these challenges as well as the physical demands of the ride!

It may be very beneficial to occasionally do half of your workout, pull the saddle for a break, and then continue with the rest of the session—it will accustom your horse to what he will encounter at the ride.

You can also prepare your horse by doing your own "vet check"—trot out and back, check the horse over, and take P&Rs—as your horse would do at an AERC ride.

An excellent way to train for all of these things is to volunteer to help mark trail. Your ride manager will appreciate it and you won't get lost on ride day!

Modify as needed

If you have built up to a certain amount of mileage at specific speeds by, say, Week 9 and then you decide to try some training on rocky roads or on hilly trails, remember that you may (almost certainly will) need to reset your expectations. Allow your horse to further its conditioning on these newer, more demanding, trails.

Ring work can be substituted for the middle session. Hill work can be substituted for longer or harder duration. Riding lessons can be substituted for one of the "harder" workouts.

At this level of conditioning it is important to be sure that your horse is indeed getting more fit. One simple way is to monitor progress over a set distance using time and/or your horse's heart rate. Let's say you find a section of trail that you can measure. It can be a mile or it can be from this tree to that bridge—it just has to be a set distance. When you start your program you can see how long it takes you to get from one end of the set distance to the other at a set pace (trot or fast walk). You can take your horse's heart rate and record it at the beginning and end of the measured distance.

As you train you can do that measured distance again and either increase the pace, as your horse tolerates it, and see if your time over that distance is decreasing—or do the distance at the same pace and see if your horse's heart rate is lower at the end. Either system will give you a general idea of increasing (or not) fitness.

Here would be a very general example for a horse that has been ridden lightly but is not fit. Each workout is preceded by a warm-up and followed by a cool-down (walking). Warm-ups and cool-downs should be at least five to eight minutes long and can be progressive, meaning you can walk first in the warm-up then jog or trot a few minutes; some horses even benefit from a faster gait at the end of warm-ups to help stretch and loosen them as needed. Listen to your own horse as to what type of warm-up works best.

Cool-downs are the same and should be tailored to the individual horse. Some horses actually cool down better with slow trotting rather than walking. This may be especially important in hot weather where walking in sun and no breeze is in fact hotter than a slow trot that helps with evaporative cooling.

Week 1 Day 1: Jog 5 mins, walk 3 mins Do this 5 times. (40 minutes)

Day 2: Jog 3 mins, Walk 3mins. Do this 5 times. (30 minutes)

Day 3: Jog 5mins, Walk 3 mins. Do this 4 times. (32 minutes)

Week 2 Day 1: Jog 5 mins, walk 2 mins. Do this 6 times. (42 minutes)

Day 2: Jog 3 mins, walk 2 mins. Do this 6 times. (30 minutes)

Day 3: Jog 5 mins, walk 2 mins. Do this 5 times. (35 minutes)

Week 3 Day 1: Jog 5 mins, walk 2 mins, working trot 5 mins, walk 2 mins. Do this 5 times. (56 minutes)

Day 2: Jog 3 mins, walk 2 mins. Do this 8 times. (40 minutes)

Day 3: Jog 5 mins, walk 2 mins, working trot 5 mins, walk 2 mins. Do this 3 times. (42 minutes)

Week 4 Day 1: Jog 5 mins, walk 2 mins, trot 3 mins, walk 2 mins. Do this 4 times. (48 minutes)

Day 2: Jog 3 mins, walk 2 mins, trot 3 mins, walk 2 mins. Do this 3 times. (30 minutes)

Day 3: Jog 5 mins, walk 2 mins, trot 3 mins, walk 2 mins. Do this 5 times. (60 minutes)

Week 5 Day 1: Trot 5 mins, walk 1 min. Do this 10 times. (60 minutes)

Day 2: Trot 5 mins, walk 2 mins. Do this 6 times. (42 minutes)

Day 3: Trot 5 mins, walk 1 min. Do this 8 times. (48 minutes)

... and so on, increasing the proportion of "working" to walking, and the overall time. By about Week 8, a horse could be alternating trotting with jogging, eliminating the walk.

Individuals should to modify the program to their own unique situation. If you can only—or most easily—ride on weekends, one of those two days must be the easiest day. Try to insert a mid-week ride, even if it is in the ring or on the side of the road. It is almost impossible to correctly condition a horse with only weekend work but you can be innovative with work at other times and may have to fit in an early morning lunging session and a late evening session on other weekdays.

As the work progresses, one or two periods of cantering can be inserted. Try to trot both diagonals and canter both leads—there is ample time to combine "training" with "conditioning."

This is also an excellent opportunity to incidentally perfect your transitions!

Week 13: the ride approaches

By about Week 7 (just over halfway through) your workouts should be about two hours, and cover about 12 miles. By around Week 11 you should be up to four hours and 20 miles. Remember, Week 12 will be an "easy recovery week"—week 13 will be your ride!

It is very difficult for some of us to find time to ride for four hours on a regular basis. Increased speed (as in a faster trot, or more cantering) can be cautiously substituted for

miles—but remember never to increase both at the same time! And these increases should come only after ample evidence of successful conditioning on the part of your horse.

Monitor the legs, body weight, recovery, and attitude closely—and don't hesitate to back off the workload at the first signs of trouble. Taking a less fit horse to the competition may not jeopardize your chances of completing; taking a tired or sore horse will.

This has been just a very general outline of a program for progressive training. It *must* be adapted to individual circumstances. The first step to success, though, is having a plan. Now you know how to formulate one. ■



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Using Posting and the Diagonals for Equine Body Building

Endurance riders and their horses spend a lot of time at the trot, so let's examine what we know (and perhaps don't know) about the things that can and do happen at that gait.

Most riders think of the trot as a two beat, diagonal gait; the horse moves his legs in alternate diagonal pairs. Few endurance riders spend much time thinking about the space between the beats, or wonder about the mechanics of what happens during that time.

If a composer were to write music to accompany the movement of horses, he would have to write in 4/4 time to be in sync with the horse when it was trotting, even though we talk about the trot as having only two beats. The other two parts of the trot are the suspension phases which occur between each beat or paired leg strike of the horse. The suspension phase of the trot is important to endurance riders because it amounts to both a "get out of jail free" card and the "collect \$200" space in Monopoly. It is a time when both horse and rider can get "something for nothing" (almost).

The suspension phase is called by that name precisely because the horse's feet are *suspended above the ground* during that mechanical phase of the gait. More importantly, the horse's body is still moving forward in space *while* its feet are suspended off the ground!

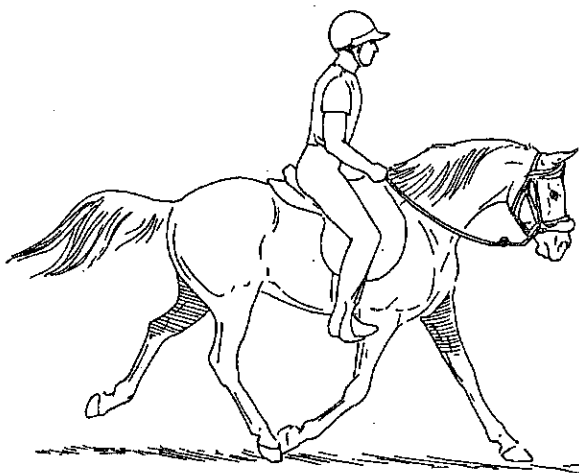
Let's think about this. Our goal in endurance is to cover a given distance in the least amount of time, with the least amount of stress to the horse, right? How much stress (concussion) do you think the horse's body is receiving when all four of his legs are suspended above the ground (this is the "get out of jail free" part)? Now add the fact that your horse is "eating up the miles," so to speak, even while his tootsies are airborne (the "collect \$200" part) and you will begin to see why endurance riders *should* be paying a lot of attention to the suspension phase of their horse's trot!

The downside of good suspension in the trot stride is what I call "hang time," or the time the rider's pelvis must stay in

the air. The longer the floating or suspended portion of the horse's stride, the longer the rider's hips must stay up out of the saddle. For small women and short legged riders, staying up out of the saddle is harder because of the shorter arc which occurs when the rider's hips pivot over their knees. A long thigh bone means a longer arc, which takes more time. A short thigh means a short arc, which re-

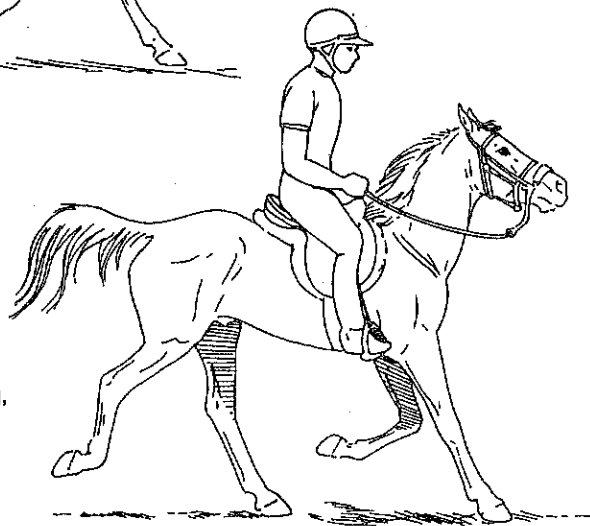
sion from birth. A horse who has good suspension in its stride can be robbed of its suspension by becoming stiff in its movement and tight in its back. Back tightness can be caused by uncomfortable tack, lack of muscle strength, overworked muscles, uneducated carriage, and pain.

Suspension can be improved in a horse by 1) improving the strength and mass of the muscles of horse's loin and



Left: A horse moving in a balanced frame with elevated back and rounded topline.

Right: An unbalanced horse, showing a hollow back, inverted neck and a shortened stride as a result of its poor biomechanical posture.



Drawings courtesy Macmillan Publishing, from "The Complete Guide to Endurance Riding and Competition," by Donna Snyder-Smith

turns the rider to the saddle more quickly. In the case of a horse with a lot of suspension, a small, short legged rider can find themselves returning to the saddle too early, bumping down and falling behind the energy and motion of his or her horse. Despite that fact, every rider should try to improve the amount of suspension time in the trot stride of their horse.

A number of factors influence the amount of suspension in a horse's stride. Some horses have a great deal of suspen-

back; 2) improving muscle strength in the horse's hindquarters, to improve both the horse's carrying capacity and its driving or thrusting power; 3) developing flexibility in the horse's joints, especially the joints of its hind legs from the hip to hoof, so the horse can load its "springs" fully at each stride; and 4) teaching the horse to carry itself in a frame which allows it to use the ground as a springboard to its next step(s).

While using gymnastic training

mixed with distance conditioning is the best way to access your horse's greatest athletic potential, anyone who posts (rises) to the trot can be improving the thrusting power of his or her horse. Here's how.

Many riders "rise" to the trot using their own muscles to thrust against the stirrups or by pinching their knee against the saddle and using their back muscles to force themselves up and forward as the horse trots. These techniques sap the rider's energy, cause sore knees, backs, numb feet and a swinging, unstable lower leg. More importantly, when the rider uses their own muscles to supply the energy to lift themselves out of the saddle, they fail to use one of the simplest resistance training techniques available.

To understand, let's look at what happens if the rider *doesn't* lift themselves off the horse's back with their own energy. In this case, the rider waits for the energy generated by horse's thrusting hind leg to propel them upwards. When a rider rides in this manner, they are using their own weight as resistance. Resistance training is a staple in body building work. In the right amounts, resistance training builds strength and shortens training time. For example, you want to strengthen the muscles of your arms to help lift heavy objects over your head. You can lift your arms repetitively 500 times a day and the muscles which do the job will become stronger, but if you hold 5-pound weights in each hand while you do it, your arm will not only become stronger, that strength will be gained in a shorter amount of time.

So back to our horse. When the rider stays in the saddle and allows the horse's energy to thrust them up and forward, the rider's weight is providing resistance to the action/muscles of the leg the horse is using to propel itself forward over the ground. This resistance training helps the horse become stronger and once the horse has developed more and stronger muscles, the rider uses their aids to frame the horse's body/energy, so the horse lifts its body into the air when propelling itself forward over the ground.

Energy directed into suspension which slowed the horse's motion over the ground, such as the piaffe or passage (highly suspended trotting) seen in dressage riding, would be undesirable in the endurance horse, but energy cultivated and captured to produce suspension, while at the same time producing a maxi-

imum of ground gaining gives the horse a "free" ride forward. His time in the air (when none of his feet are touching the earth), produces no jar or concussion. Increased suspension in a gait also increases a horse's ability to land his feet lightly and "bounce" into the next stride, without succumbing to the inertia-producing force of gravity. It goes something like "an object in motion requires less energy to stay in motion than an object requires to get in motion."

To adapt your posting to take advantage of this training technique, it is necessary to stack your body in a balanced manner over your feet. Riding in a chair seat with your feet at your horse's shoulders, collapsing your upper body, or riding with stiff ankles with toes pushed down against your stirrups will prevent you from finding the timing that allows your horse's energy to work for you.

Once you find this balanced position, keep your knees softly flexed and simply wait until you feel the energy of your horse lift your hip forward and up out of the saddle. At the height of that arc, simply bend your knee and return to the saddle by kneeling, rather than by sitting back toward the cantle of the saddle as you return to your horse's back.

Riders need to be aware of and change their diagonals regularly, rising first with one shoulder, then with the other. In training I change my diagonal every couple of miles and *every* time my horse changes his bend, if the trail is made up of extremely sharp curves, such as switchbacks.

It is very common for a horse to have one hind leg that is stronger than the other. When you post, the horse will want you on his strong leg. If you are not alert, you will find yourself always rising on the same diagonal. As time proceeds, your horse will become more and more developed on one side and weaker on the other. After a time, this can cause uneven muscling in both the horse's shoulder and hip. This uneven muscling then can and does cause saddle fit problems. An unevenly muscled horse is also at greater risk of injury. So learning to recognize your diagonals and changing them is important, as is using your riding skills to train your horse to float when he moves.

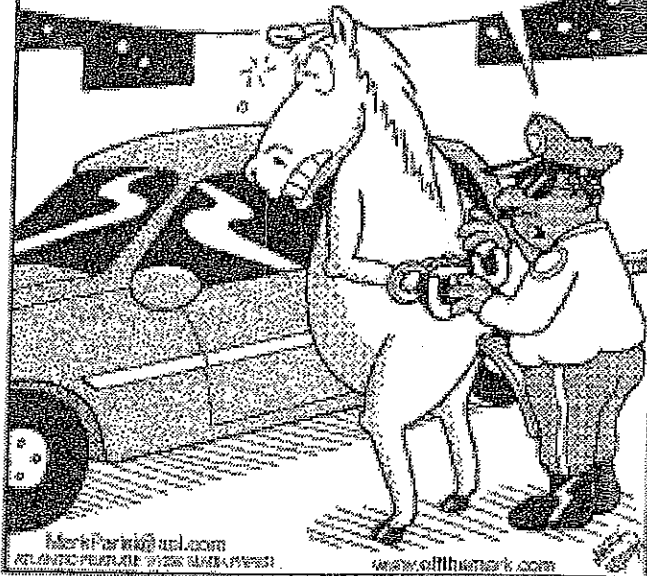
One last note. For riders whose horses bounce too much in trot, the same techniques described above will allow you to capture your horse's excessive upward energy with your body and redirect it into a more linear trajectory. ♦

off the mark

by Mark Parisi

www.offthemark.com

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Why do horses eat dirt, wood, and other indigestible things?

Dr. Christine King

This article is about a few of the seemingly aberrant feeding behaviors one sees from time to time in domestic horses. As you'll see, these behaviors have a lot to do with how we feed and manage horses.

Why do horses eat dirt?

Dirt eating can be normal behavior in horses. In most cases it is probably a form of self-supplementation or self-medication. (Based on observation of wild animals, most biologists and naturalists agree that animals do appear to self-medicate at various times and in various ways. *Wild Health: lessons in natural health from the animal kingdom* is a wonderful book on this subject by biologist Cindy Engel, PhD, if you're interested in reading more.)

Horses may eat dirt for any one of several reasons:

- needing salt (specifically, the sodium in salt)
- needing other minerals
- needing beneficial micro-organisms from the soil to aid digestion
- needing the absorbent activity of clay to settle a digestive upset
- boredom, habit
- presence of a disease which alters mental function

Salt and mineral seeking behavior

Horses and other herbivores are meant to get the minerals they need for health, growth, and reproduction from their food—plant material. The more varied the selection of plant materials and grazing areas, the more able horses are to meet their needs. Sometimes, though, the available forage does not meet all of their mineral needs, so they must go in search of other sources of sodium and whatever other minerals they may be lacking at the time. This salt- or mineral-seeking behavior leads them to lick rocks, earth, and even each other. (Gross and long-standing dietary deficiencies in phosphorus or protein may even lead herbivores to chew on the carcasses of other animals.)

Offering the horse salt and feeding a well-formulated mineral supplement that is appropriate for the individual horse's needs should stop the dirt eating if this behavior is being driven by nutritional deficiency. My preference for feeding salt to horses is to offer it free-choice, as loose or block salt in a pan separate from the horse's food. Not a mineral block; just plain salt. It can be no-frills coarse rock salt or a white salt block, Redmond salt (a good-tasting natural-source salt whose impurities give it a pink tinge), or a fancy Celtic sea salt. It doesn't matter all that much, as long as the product is close to 100% salt (sodium chloride) and not a bunch of other minerals.

I prefer not to add salt to the horse's food or put a salt block in the bottom of the horse's feeder, unless I'm trying to increase the horse's sodium or water intake for a specific medical reason. The body regulates its sodium content very closely, as the sodium concentration in the blood

and other body fluids is one of the prime determinants of the body's total water content. An adequate but not excessive amount of water is essential for virtually every function in the body, so the body regulates its water content very closely. In addition to the mechanisms of thirst/drinking and urination for controlling its water content, the body has a specific and very refined appetite for sodium. This mechanism is so well regulated that I prefer to let the horse's body take in as little or as much salt as it needs at the time, rather than thinking I know better.

This regulatory mechanism (involving a specific appetite) seems to be far less refined with other minerals. That is one reason I don't like using mineral-salt blocks for horses. The horse has a specific appetite for salt, so if the horse goes in search of salt, then I'd rather she not inadvertently take in other minerals as well as salt when those extra minerals may not be needed at that time.

Other issues I have with mineral-salt blocks include the formulation (many are intended for both cattle and horses, and that doesn't work well for either species), the amounts of the various minerals supplied (the horse may get too much or too little of a particular mineral, as intake of the mineral block is primarily driven by salt appetite or the presence of a taste enhancer such as molasses), lack of specificity for the individual's needs, and the form of minerals used (typically they have very low bioavailability in horses).

For these reasons, I prefer to feed a well-formulated mineral supplement (selected for the individual horse's needs) and offer salt separately and free-choice. I love the idea of offering minerals to horses free-choice. After all, that is how wild herbivores supplement their mineral needs when their diets are deficient: they go looking for other sources of minerals and consume that source until they've met their body's needs. However, I think this concept is very difficult to execute well when it comes to supplementing our well-fed domestic horses.

There is at least one equine feed supplement company which advocates feeding minerals free choice. A variety of different mineral supplements are offered, each designed to meet a primary deficiency a horse may have. My main problem with this approach, though, is that most of these products contain fillers or carriers which double as taste enhancers, such as wheat middlings, alfalfa, and even salt or a sweetener. It is an erroneous conclusion to say that a horse was lacking in a particular group of minerals because he licked the bowl clean of a particular supplement, when what he most likely was after is the wheat or alfalfa. In my experience with these products, it is common for horses, especially the overweight carb junkies, to practically inhale some of these tastier offerings and completely ignore the less palatable ones.

I keep hoping to find a really good natural-source, free-choice mineral supplement for horses that is based on how wild herbivores normally meet their mineral needs when their forage diets are lacking. Until I find a product I'm really satisfied with, I'll continue to recommend supplements that have been thoughtfully formulated by well-trained and credentialed equine nutritionists and that are backed by good clinical research and practical use in many different situations. There are several such products available that meet these criteria. My favorite so far is Platinum Performance Equine (www.platinumperformance.com).

Beneficial soil microbes

The third possibility on the list is that the dirt-eating horse is in need of beneficial micro-organisms from the soil to aid digestion. Healthy digestion in horses relies on a healthy population of bacteria, protozoa, fungi, and other micro-organisms in the digestive tract, particularly the large intestine (cecum and large colon). These organisms aid in digestion, particularly the breakdown of dietary fiber, and they serve as an effective defense against potentially harmful (i.e. pathogenic) bacteria such as *E. coli* and *Salmonella*.

These beneficial organisms are primarily derived from plant material and the soil in which it grows. (In young foals, the feces of older horses provide many of these microbes.) Horses on highly processed diets and who get very little pasture turnout time can be deficient in these essential microbes. My preference for resolving this problem is to provide more pasture turnout time and a more natural diet. Supplementing intestinal organisms in the form of a probiotic product is a poor second to allowing the horse to live closer to the earth.

Probiotics definitely have their place in equine medicine. However, we're still a long way from really understanding that place and having a good grip on effective probiotic use in horses. In my experience, probiotics too often are overused, inappropriately used, and even inappropriately formulated for horses. We still know too little about the veritable universe of micro-organisms which normally inhabit the healthy horse's digestive tract to know what, if any, microbes we should be adding, and in what quantity and for how long. Only a handful of studies on probiotics have been conducted in horses so far, and in some of those studies specific micro-organisms thought to be beneficial as probiotics actually caused diarrhea and other digestive upsets.

There are other issues with probiotic products, not the least of which are quality control (whether what is listed on the label is actually in the product, the viability of the organisms, etc.) and dosage (how many organisms are needed, and for how long). But that's a topic for another time.

The most intriguing probiotic product I've come across so far is Primal Defense by Garden of Life. It's a human product formulated to supply the types of micro-organisms we'd naturally get from the soil via our food if we lived a more natural lifestyle and ate a more natural diet. I love this product for dogs and cats (and humans), but for horses I recommend it only for chronic, unresponsive digestive disturbances or following intensive antibiotic therapy. Provided the horse gets to graze for at least a few hours per day, he should be getting a good quantity of these beneficial soil organisms directly from nature, so probiotic supplements should not be needed unless there is a long-standing disruption in the normal intestinal flora.

Absorbent properties of clay

Microbes aside, some horses appear to eat dirt primarily for its absorbent properties. Clays, in particular, contain very absorbent particles which can bind up bacterial toxins, organic acids, certain viruses, and other potentially harmful substances in the gut. The bound toxins are then harmlessly removed from the body in the manure.

I have known seriously ill horses with disordered digestive tracts to selectively eat the clods of dirt that cling to the roots of a clump of grass rather than eating the grass itself. That's not to say

that if a horse is eating dirt then she may be seriously ill. However, it is worth considering that she may have a digestive upset of some sort. For example, there may be too much starch or sugar in the diet (whether from grain or lush grass) which has disordered the normal microbial population of the digestive tract. In addition to restoring the microbial population in the bowel, eating dirt may be helping simply by virtue of its absorbent properties.

There are several different clays that have been refined for use as medications or as feed additives for the prevention of digestive problems in feedlot cattle on high-grain diets. They include kaolin, bentonite, montmorillonite, and smectite. I used to use bentonite as a feed additive in uptight horses on high-grain diets. It worked very well to calm the horse and normalize the manure, which otherwise was loose and smelly. These days I much prefer to decrease the amount grain in the diet and use fat instead to meet the horse's caloric needs.

For horses with digestive problems, and for those who continue to eat dirt despite salt and mineral supplementation and plenty of pasture turnout, it may be worth reviewing the diet and, if dietary changes don't do the trick, adding BioSponge (www.platinumperformance.com) to the diet for awhile. BioSponge, as the name suggests, is a dietary aid that contains one of the super-absorbent clays. It has been tested in horses, in an independent study at the University of California-Davis, and found to effectively absorb bacterial toxins in the horse's bowel. While the horse may get what she needs by eating dirt, I'd prefer to use a refined clay rather than dirt, with all its impurities and who-knows-what-else.

Other reasons

For horses who eat dirt out of boredom or habit, providing more grazing time (or more simulated grazing time in the form of hay), more company, and more daily activity which is physically and mentally stimulating should help. If the horse is eating dirt because of a disease which is affecting mental function, then there will likely be other behavioral or physical indicators of illness. These horses require veterinary attention.

Why do horses chew wood and debark trees?

Wood eating can be normal behavior in horses, or it can indicate a problem, such as illness, inadequate dietary fiber, or boredom. Bark, branches, roots, and other seemingly inedible plant parts form a small but important component of the horse's natural diet. These plant parts provide extra fiber and a diversity of nutrients. Bark, twig, and root eating may also be a form of self medication in some instances, as these plant parts often contain substances with medicinal properties (e.g. anti-inflammatory salicylates in white willow bark). But that's a topic for another time.

As they rely on it for digestive health and energy production, horses have an absolute need for dietary fiber ("roughage"). The rock-bottom *minimum* amount of roughage needed per day is 1% of the horse's body weight, calculated on a dry matter basis (i.e. taking into account the water content of the food). Well-made and properly stored hay is less than 10% water, so to keep the mathematics simple, let's say it is close enough to 100% dry matter. That means the daily *minimum* fiber requirement, if the horse consumes little or no pasture, is 10 lbs of hay per day for a 1000-lb horse (1% of 1000 is 10). That's just to meet the horse's minimum fiber requirements; calories, protein, vitamins, and minerals will very likely be lacking at this level. Most horses are

much healthier and happier when fed good quality roughage at a rate of 1.5% to 3% of body weight per day (15–30 lbs of hay, if pasture is limited).

Depending on the time of year, the water content of pasture grasses can be over 70% (i.e. less than 30% dry matter, including dietary fiber). In the spring and sometimes in the autumn, when the grass is lush and rapidly growing, a horse on full pasture turnout may not be able to meet his minimum daily requirement for dietary fiber from pasture alone, even when there is plenty of grass. At these times, horses on pasture often benefit from supplemental hay to meet their daily fiber needs.

If the horse is not getting his fiber requirements from his diet, then he will go in search of it. That's when horses begin chewing fence posts, boards, wood stall doors or partitions, trees, etc. Bored horses also have a tendency to chew these objects. So, in addition to providing more variety in the diet and more pasture turnout (and/or hay), also provide more physical, mental, and social stimulation for the horse.

Why do horses eat manure?

Manure eating (coprophagia) can be normal behavior in horses. In young foals, eating the mother's manure is a normal developmental stage. Through this behavior the foal learns to explore his environment and use his senses to make choices about what is palatable and what is not. He is also getting some dietary fiber and the beneficial intestinal microbes needed to support his own digestive processes once he begins eating solid food. In addition, the healthy intestinal microbes are an effective barrier to pathogenic bacteria which could adversely affect the foal's health.

In older foals and adult horses, manure eating may be a way of supplementing intestinal microbes, dietary fiber, and perhaps other nutrients that are lacking in the horse's own diet. Coprophagia is normal and nutritionally necessary behavior in rabbits, a species whose intestinal tract is very similar to that of the horse. Many nutrients released or produced by microbial breakdown of dietary fiber, as well as the microbes themselves (which are a rich source of proteins, lipids, vitamins, and numerous co-factors), are lost in the manure. Rabbits make effective use of these valuable nutrients by ingesting manure for a second pass. Perhaps some horses who eat manure are doing a similar thing, particularly if they are on a very restricted diet (e.g. dry lotted with just poor quality grass hay because they need to lose weight).

Manure eating in horses can also be caused by boredom or social disorder (e.g. isolation, incompatible company, frequent changes in the horse's turnout routine or companions). As with dirt and wood eating, taking a closer look at the horse's diet and management should identify where improvements may be needed.