

# Biomechanics to a Better Barefoot

by Leah Hinnefeld

Any horse owner that has made the choice to take her horse shoeless doesn't have to travel far from the last shoe being pulled to realize that this process is much more than just a trim! Now don't get me wrong, the trim IS essential, but there are several steps to creating a happy, healthy and successful barefoot athlete.

An initial step of the journey often requires a look in the **feed room**. A good steward of her barefoot steed will surely have spent some time on the equine nutrition website of Katy Watts, [www.safergrass.org](http://www.safergrass.org). While my horses' feet are much better now that I am no longer feeding them like cows, my parents are still adjusting to the idea that I bought 20 acres of lush pasture so that I could still hunt and search for low-sugar hay! My neighbors are confused at my joy when dump trucks arrive to spread pea gravel all over the dry lot that houses my horses twelve hours each day.

Once an owner has found the trimmer, bought the muzzles and balanced the minerals, the next step is to peek into the **tack room**. Suddenly she may come to realize that her beloved saddle—her safety, security, and sometimes her fashion statement—may well be the enemy to a healthy equine athlete! I only needed to invest one weekend with Carol Brett, co-owner of Balance International, Inc. to realize that my favorite saddle was only wide enough to fit the “withers” of my Australian Shepherd, Zack.

I consider 1) the trim, 2) nutrition & environment, and 3) tack & equipment to be three of the cornerstones to building a solid foundation for a healthy and agile equine athlete that stands on healthy, strong feet. What happens when one has consciously addressed the first three cornerstones, yet the feet still are fighting back?

It is time to take a good hard look at the fourth cornerstone, **Correct Biomechanics!**

Biome-HUH?

Biomechanics is defined as, “the study of mechanical behaviors of living organisms and structures. Biomechanics is about the physics of Physiology, i.e., *the forces that act on the limb.*” (<http://www.websters-online-dictionary.org/Bi/Biomechanics.html>, emphasis added).

Simply put, Equine Biomechanics as it relates to the hoof is the study of how the force and impact of the weight of the horse (and rider while mounted) affects the hoof during different gaits, while traveling in all kinds of directions, in straight lines, circles and serpentine, or any lateral maneuver!

A balanced hoof, under a properly-fed digestive system, girthed with a properly-fitted saddle certainly opens the door for healthy feet, but if a horse has not learned to carry himself in balance, and, more specifically, in a relaxed, balanced state, the door can seem quite narrow to finding a healthier, more athletic horse.

So, how exactly does biomechanics affect the feet? Most hoof care practitioners will agree that a horse should land flat or slightly heel-first. The detriment of a toe-first landing has been covered in-depth in many hoof care articles, magazines and books.

What happens then? Is that all we need to worry about? Certainly not! Just take a moment to watch any horse on a pretty, spring day, and see him twist and torque and bend and leap. Realize with every movement, he is loading different parts of his feet, therefore creating pressure and stimulus to different parts of the hoof. This idea of pressure and loading should not be something new to anyone that is hoof-obsessed! Could it be that the wild horse has such lovely feet because he is not only permitted, but required, to travel in a balanced posture for his own livelihood? What may be something new is realizing what a HUGE impact this loading can have on bare hooves, and how we can use simple exercises that benefit the body to also benefit the feet.

I would like to share with you a part of my journey, and how pleased I have been with the success of creating not only healthier and happier horse bodies, but healthier and happier hooves! Interestingly enough, I started learning about **true** straightness in order to help a horse with back and body issues. I became more focused on the meaning of **true** straightness to protect the welfare of the rest of my horses. It was really only an “afterthought” that I learned how important the connection of correct biomechanics while riding is to properly functioning feet.

In order to assist my horse to travel straight, I first had to develop an **understanding** as to what **true** straightness IS with respect to the horse. The best and clearest definition I have found is from Dr. Deb Bennett: “**A horse is straight when his sternum (breastbone) is centered between his elbows (and shoulder joints).**” ([http://equinestudies.org/knowledge\\_base/woody.html](http://equinestudies.org/knowledge_base/woody.html))

Straightness is easiest to see and understand in a standing horse or a horse walking in a straight line. When a horse travels on a circle, however, his body must have a soft bend that mirrors the arc of the circle and his inside hind must travel in and under toward his navel. For this reason,

I now find straightness easier to envision if I think of it as correct or true **alignment**.

Horses, like people, are born one-sided. They are inherently crooked. They will either be right-sided or left-sided. When we add the weight of the rider and her inherent crookedness, this creates an even greater impact on the balance of the horse, and ultimately on the balance of the hooves. We must accept that our crooked posture, if not addressed, will magnify this lack of straightness while riding the horse. Perhaps this truth explains why some pasture horses seem to have feet that are in better balance and alignment than those we ride daily.

The most obvious occasion to see crookedness and its impact on not only the body of the horse, but also in the hooves, is to observe an injured horse that does not fully load the weight on the injured limb. The horse may over-develop one shoulder to compensate for the injured shoulder. He may also develop mismatched feet, if the injury lasts long enough.

But could this uneven loading from inherent crookedness or traveling without balance be seen in the hooves of our “sound” horses? I am talking about horses that have no obvious limping, lameness or injury. I am talking about horses that we see every day in our own pasture, on a trail or at a horse show. Could that lingering toe crack NOT be grounded in the trim, low grade laminitis, or fungus; but rather be a direct result of the inherent crookedness of the horse? Could those still slightly underrun heels be telling you he is still not in total alignment and correct posture? I am here to tell you YES!

If one considers that pressure stimulates growth, and more specifically, that correct pressure stimulates correct growth (a phrase from KC LaPierre that has been forever tattooed in my

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**Could some hoof cracks be caused by the horse's inherent crookedness?**

mind), then an over-weighted or over-loaded foot will receive more pressure, which could in fact over-stimulate that foot. Increased pressure could increase growth, or taken to the extreme, could then cause breakdown of the structure. Think of a weight lifter. If he loads one muscle more than another, the loaded muscle will increase in growth. If the body builder pushes the muscle too far, it can result in injury and breakdown of the muscle.

Contemplate a horse traveling on his forehead. No matter how beautiful his heel-first landing is during his natural balance, that foot could easily shift to a toe-first landing if a horse is permitted to travel in a downhill posture. Perhaps the trimmer's inability to bring the heels back to the widest part of the frog has nothing to do with the trim but results from the horse traveling in that downhill, on-the-forehand posture. Add a rider that leans forward in the saddle, and it is a viscous cycle, impossible to break.



**When a horse dubs its hind toes (note front curve of hoof), it doesn't mean the hoof is wearing too fast and needs shoes—it means the horse needs to engage its hindquarters and stop dragging the toes!**

Another example, very commonly seen at any riding stable, is the horse that drags his toes because he is not engaging his hind end, bending his rear limb joints and reaching under his belly. You don't have to squint to recognize those rear hooves that are squared off at the toe after schooling in a sand arena! Over time, the unhealthy dubbing of the hooves can significantly change the growth pattern of that hoof. Taking things one step further, could he be locked in a downhill posture because he is leaning left or right just a little when he travels?

Now consider that the foot not traveling properly underneath the horse (because it is swinging in or swinging out) will also be loading unevenly. In this example, a portion of the hoof, the medial or lateral side would receive more pressure and more stimulation, which will change the growth of that foot, and may eventually change the growth of all feet. This crookedness is commonly seen in a horse trav-

eling improperly on a circle, or in a weak horse that swings a shoulder or hip in or out on a straight line.

Why does this happen? If a horse is left-sided, he will be stronger (which translates to stiffer or more braced) on his left side. When traveling left he will lean in on his inside (left) shoulder. Because of this posture, the left foreleg will not stride out as far. This posture results in the left forefoot contacting the ground sooner than the right forefoot and creates more pressure, or a heavier load, on that inside foot. When a left-sided horse travels right on the circle, his left shoulder will bulge out or pull away from the center of the circle. Just take a moment to visualize how these two different scenarios may create different pressure or stimulus to each hoof.

My horse, Milo, is left sided and once I began riding him, his front feet changed from a matched set to looking like two feet from two different breeds of horses! Because Milo was technically sound, I stopped worrying about his feet and decided it must have something to do with his conformation, or how the coffin bone was shaped, or how he naturally moved. When I addressed his left-sidedness through biomechanical exercises, his front feet became more balanced to each other NATURALLY, not because I tried to rasp feet that mirrored each other.

My other left-sided horse, Julian, travels in a similar manner; however his extreme left sidedness is seen more prominently in his right rear. On a circle, he "wings" his right rear out, leans to the left and tips his hips to the inside of a circle to avoid bending his hocks. The right rear hoof has a strong lateral flare that needs to be addressed at each trim. When he is in work and not helped to travel straight, the flare gets worse. He also has a persistent hairline crack in the quarter that I have not been able to "fix" with trimming and fungus treatment. As I am learning to truly get his body in alignment through exercises, his flare is diminishing.

It is interesting to note that I am left-handed, and once in training, my horses all present as



**Above: Though the horse is not traveling completely inverted or with an obvious incorrect bend, he is still not using his body in an efficient manner—the evidence will be seen in his hooves. Below: He is learning to use his body in a more biomechanically-correct way, approaching longitudinal flexion with a more correct lateral bend. His hooves will reflect the improved balance.**



Photos ©The Horse's Hoof

left-sided. I have to question whether each horse is in fact inherently left-sided or is now simply a mirror of my left-handedness. The bad news is, his crookedness, whether inherent or man-made, must be corrected; the good news is, no matter what "side" your horse is, there is a way to correct it.

A good way to understand all of this talk (if it sounds like Greek or gibberish to you) is to think of the tires on your car. When the car is out of alignment or balance, you will see different wear patterns on each tire. One tire may wear tread out faster on the outside than the inside of that tire, a right tire may wear more than a left, or the fronts wear faster than the rears.

For a more in-depth discussion of the affects of inherent crookedness of the horse I have found several excellent sources. The first can be found online (for free!) at the website of Dr. Deb Bennett, [www.equinestudies.org](http://www.equinestudies.org). Dr. Bennett has authored are two excellent articles, the "Woody Article," ([http://equinestudies.org/knowledge\\_base/woody.html](http://equinestudies.org/knowledge_base/woody.html)) and "True Collection," ([http://equinestudies.org/knowledge\\_base/true\\_collection.html](http://equinestudies.org/knowledge_base/true_collection.html)). In the

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“Lessons From Woody,” Dr. Bennett brilliantly explains how crooked posture, leaning and imbalance gives obvious feedback in the feet. She offers very detailed drawings and photographs with descriptions. “Woody” was written to explain the impact of crookedness on orthopedics and the principles are easily applied to the barefoot horse. If you are interested in even more in-depth discussion of straightness and how it relates to collection, then “True Collection” is a must-read. As you can imagine, improper or “forced” collection is going to show up in the feet, as well!

Another one of my favorite resources is a book entitled, ***Straightening the Crooked Horse***, by Gabriele Rachen-Schoeneich and Klaus Schoeneich. This book is filled with photographs showing horses traveling on the circle, both in-balance and out-of-balance. The authors give very detailed explanations of left-sidedness and right-sidedness, with photos of how the biomechanics of the horse are disturbed by traveling in a crooked posture. This book goes into detail regarding shear force, centrifugal force and diagonal balance as it relates to crookedness. The book also has a program for developing the horse into one that travels in a more correct and straight posture.

Once a horse learns to travel in alignment, his posture will improve not only in hand and under saddle but *while he is at liberty in his pasture*. His body and feet can literally be reprogrammed to carry a correct posture when he is standing, grazing and moseying with his pasture mates. I am amazed at the transformation in the natural posture of each of my horses as I have implemented a “straightening program.” And as you have probably guessed by now, I am finding the feet also maintain balance for longer periods between trims!

Biomechanics addresses the elements of impact and movement; however, the owner must also understand that mental and emotional imbalances in the horse contribute further to physical imbalances. How does your body feel at the end of the day if you have been mentally stressed? Have you ever become muscle sore because of the tension you held in your body when you were afraid? When you are tense, do you “shorten your stride” or “overreach?” Observe a nervous Thoroughbred away from home for the first time, and it is easy to see the jumping skin, high head and flexing underneck. It is then obvious to see that emotions and mental stability can greatly affect physical balance. Now imagine this tense horse moving. Could his hollow, tense back be somehow related to his not-yet-perfect feet? You tell me!

Because of the absolute connection of mental and emotional balance to physical balance, I am especially excited to recommend a recent

publication (book and DVD) by Karen Rohlf, entitled ***Dressage, Naturally*** ([www.dressagenaturally.net](http://www.dressagenaturally.net)) While this book initially appears to be a dressage book, don't be fooled, because it is so much more! Karen does an outstanding job explaining alignment and posture, provides exercises to create or restore correct alignment, and emphasizes the importance in developing the horse emotionally and physically.

I have found the information and exercises in the aforementioned books and websites to be not only enjoyable and educational, but essential for creating a supple horse that can trail ride, jump, run barrels or “do dressage” while moving and performing the best that he physically is capable of!

Traveling in a correct biomechanical posture is essential for a healthy, light, flexible and mobile horse that is strong and balanced; it is undeniably paramount when we choose to climb on his back. Equally important is the impact that biomechanics has on the hoof. An emotionally stable, mentally alert and physically sound partner requires consideration of the whole horse. Not only will his body thank you, but his feet will thrive when his owner considers each cornerstone in creating the perfect foundation—that is after all, where the rubber meets the road, or the hoof meets the highway!

I do want to mention that many horses have true conformation issues that create an imbalanced way of loading the feet. Please be sure to address these deviations with your veterinarian and trimmer, as these issues are beyond the scope of this article. Before beginning any sort of conditioning program, it is always best to discuss your program with your veterinarian and trainer. Make sure there are no underlying medical or training issues contributing to your horse's crookedness that need to be addressed before reaping the benefits of biomechanics to a better barefoot!

Note to the reader: For ease of reading I have chosen to refer to the rider as “she” and the horse as “he,” realizing, of course, that owners come in both he's and she's and that the “girls” in the barn deserve the same attention to balance as the “boys.” 🐾

**About the author:** Leah Hinnefeld lives on her farm in Georgia with her family of four horses, two mini donkeys, two Australian shepherds, five barn kitties and five goats (the weedeaters). When she is not catering the needs of her family, she spends her free time practicing Equine Law. Leah tells us, “I feel so blessed to have had the opportunity to study & learn from Cindy Sullivan, Pete Ramey and, most recently, KC LaPierre. They, along with the feral horse studies of Jaime Jackson and Gene Ovniczek have greatly impacted my horse-keeping and hoof care practices.”

## Mother and Daughter Trimmers & Trainers

Bronwyn Flinn and Brittany Flinn of NSW, Australia, earned AEBM/Cavallo Horse & Rider “Riders of Distinction Awards” for 2008. This mother and daughter team both trim and train horses.

Bronwyn's main horse is Kiwi, a grey Arab/Stockhorse X. Along with Natural Horsemanship training, she enjoys pleasure riding, and is aiming to get back into showjumping. Bronwyn says, “I'm 50 something and have been riding since I was three—hadn't even thought there was any other way. I was one of three daughters who were top showjumpers in New Zealand, and Dad (who was the President of the NZ showjumping Society) did all of our shoeing.”

Daughter Brittany has just started a four year course for her Bachelor of Agricultural Business Management (Equine Studies) at Charles Sturt University, Orange NSW. She is doing most of the theory by Distance Ed., but while she does have to be away from home, her mother Bronwyn is filling in for her, trimming all her clients' horses.

Brittany backing a “maniac” Warmblood stallion after just a couple 1-hr sessions:



Brittany and her barefoot horse, Demo:



Brittany says, “I am an equine horsemanship specialist, and for fun I do a bit of showjumping. I have been trimming since about the age of 12 when mum attended a few clinics, and she showed me how to start off. I'm now 19 and trim horses all over the region for many people and love to learn everyday by coming across new hooves that I haven't seen before. The feedback from the clients has always been positive and I am excited to see the barefoot movement grow more and more.” 🐾

Photos courtesy AEBM