

BODY POSITION AND GAIT

PART II

THE MUSCLES, THE BRAIN AND THE SIDE OF THE HILL

© 1989, revised 2002, by Lee Ziegler

DEFINITIONS:

Lateral gaits: Gaits in which legs on one side (right front, right hind) move paired in time.

[pace, paso, rack, running walk]

Diagonal gaits: Gaits in which diagonal legs (right front, left hind) move paired in time. [fox trot, trot]



Stepping pace, horse in hollow position

Rack, horse is very hollow, note the trailing hind legs

Racky running walk, horse in slightly hollow position



Fox trot, horse in neutral to round position, notice the hollow in the back and neck have disappeared

Trot, going up hill, horse in neutral to round position."

Look at the pictures accompanying this article. They were all taken of the same unriden, unshod horse, on the same day. How was it possible for him to do all those different gaits without a change in shoeing or a rider cuing him for them? Since I was the person in the hat leading him through most of the gait changes, I can tell you how it was done. We worked up and down slight grades at different speeds. The differing terrain caused him to shift his balance and adapt his gait to his weight shift. He rounded his back and shifted his balance to the rear going uphill, producing either the trot or the fox trot, hollowed his back and shifted his balance forward going down, producing first the racky running walk, then, with more of an incline, the pace and rack. His bony conformation did not change as he shifted from the diagonal to the lateral gaits, but his use of his body through nerve impulse and muscle action certainly did. [The term muscle here includes the use of tendons and ligaments, since they are also part of the system that moves the bones.]

WHICH POSITION FOR WHICH GAIT?

If you look closely at these pictures, you will be able to spot the different body positions this horse used for each gait. For the diagonal gaits he traveled with a neutral to round back, no sag or hollow visible, his neck held at a moderate height, not up in the air or low to the ground. These positions of neck and back reflect his weight shift to the rear. In the more lateral gaits, he lost the roundness in his back, and raised his head and neck, forming a "dip" just before the withers. [These body changes are most visible in the pace and rack.]

WHICH MUSCLE GROUPS FOR WHICH GAITS?

This is not a technical treatise on horse anatomy and biomechanics. However, there are a few obvious muscle groups which work in certain ways in each of the gaits pictured with this article. Look at each section of the horse's body, in each gait, and you will begin to see how certain muscles contribute to each gait.

NECK: In the diagonal gaits, the trot and the fox trot, (most visible in the fox trot) this horse travels with an arched neck, the muscles and ligaments at the top of the neck stretched into a convex curve. The underside of the neck is smooth, with no obvious bulge in the muscles running from chest to throatlatch.

In the other gaits, the neck is held high, without the curved appearance it has in the diagonal ones. There is a dip in front of the withers, indicating that the ligaments and muscles of the neck are not stretched along the top of the neck. Although not clearly visible in all photos, there is a definite bulge in the lower neck, particularly in the pace and rack, which indicates a concave position.

BACK: In the trot and fox trot, the back muscles and ligaments are stretched so that there is little or no sag between the withers and the croup. Especially in the trot, the back appears full over the loin, indicating that the muscles and tendons are stretched, allowing the hindquarters to flex downwards and the hind legs to reach under the body from a lowered croup.

In the other gaits, the back appears to sag a bit from the withers to the croup. The muscles and ligaments are slack, not working to flex the hindquarters downward, and allowing the hind legs (especially in the rack and running walk) to trail behind the body of the horse.

ABDOMEN: In the trot and fox trot the abdominal muscles of the horse appear tight. They are working to form a ring with the muscles of the neck and back to keep the horse's body in a somewhat round position. They are also working to help flex the hindquarters downward to provide the horse with efficient thrusting power for going uphill.

In the other gaits, the abdominal muscles are slightly less taut. They reflect the more concave curves of the back and neck in these gaits.

WHY CHANGE GAITS?

Did this horse voluntarily decide to do different gaits in response to different terrain, or did his body automatically, reflexively, shift gait as his footing changed? How much of his action was decided by his brain, and how much of it resulted from the conditioning of his muscles? What role, if any, did his human handler play in all this? Good questions, and unfortunately, most are without definitive answers. We do know that horses tend to travel in the gaits that are most efficient for them in terms of energy expended and ground covered. They probably don't spend much time thinking about how they are going

to move, they simply go at the speed and in the gait that will get them from A to B with the least amount of work. For going uphill, diagonal gaits provide better balance and more efficient thrust than lateral ones, and most gaited horses that are able to use them will do so when climbing hills. For going downhill, although diagonal gaits still provide better balance, since the natural inclination of a horse is to carry weight on his forehand while going downhill, and since traveling with weight on the forehand almost always throws a gaited horse into a lateral gait because of the general looseness of his back, the advantage of better balance is lost as the horse moves in the gaits easiest for him in terms of energy expended. In short, gaited horses usually pace downhill! And they probably don't think about it much.

How much effect did a handler have on the gaits of this horse? Well, except for the racking picture in which there was no handler, a fair amount. I was able to sway his head from side to side, shifting his weight laterally, to produce the pace. I was able to regulate his speed to produce the fox trot. I was able to slightly shift his weight using the lead rope in a swinging motion to make him do a running walk. So, for this horse, most of the gaits shown here were partly in response to cues to his brain produced by his handler as well as partly resulting from his involuntary weight shift produced by terrain.

THE ROLE OF THE MUSCLES

The horse in these pictures had muscles and ligaments which were elastic enough to allow him to move in a rounded, neutral or hollow position, depending on which gait he happened to use, but they were not so conditioned as to force him to use one gait at all times. Many horses are not as versatile as this. Horses that pace exclusively tend to have necks and backs that will only show a concave curve. For them, the muscles and ligaments that stretch to round the bodies of horses in other gaits lack the strength and flexibility to pull their own bodies into a more rounded position. Horses that rack exclusively have a similar lack of muscle condition that prevents them from rounding into some other gait. Horses that trot exclusively, on the other hand, lack the elasticity in their backs and necks that would allow them to slightly hollow into one of the easy gaits. While innate muscle and ligament elasticity is inherited and set by nature, some change is possible through conditioning and exercise. Through a conditioning program that works on changing the tone and development of his muscles, a horse that only offers to pace when he is free in a pasture can be converted into a horse that will do one of the easy gaits, first under saddle, then at liberty. His muscle use can be modified so that he will no longer do the gait that was once "natural" to him, and instead he will prefer to do some other gait because it is now easier for him to do than the original one. This is part of what happens when any young gaited horse is broken to ride. Most of these horses will offer to do several intermediate gaits when speeded out of a walk. The rider selects the one he wants, insists that the horse do that gait, and after a time, the others disappear and the favored gait becomes the only gait of the horse, both ridden and at liberty.

THE ROLE OF THE BRAIN

We don't know how much thought a horse puts into his gaits when he is not being ridden. We do know that he responds to the cues of a rider when he is under saddle. He does this, not as an automatic reflexive behavior, but as a result of training of some kind. Training is simply teaching a horse to understand and respond to the expressed desires of the rider. To succeed, training of any kind requires a willing horse. While working in the various gaits, the role of the horse's brain is to accept cues and to transmit them to the muscles/ ligaments/ tendons and eventually bones to move the horse in the way the rider asks. The trick is to know which cues will work for which gaits, and then to make the horse understand them. We'll find out in part III of this series.

[Back to Articles](#)

