

# Biomechanics

## ...why it matters to you

Do you want a happy, athletic horse and fewer vet's bills? Then understanding equine biomechanics is vital

**D**oes your horse lean on the bit, go behind the contact, grind his teeth or swish his tail? Do you struggle to sit to your horse's paces? Would you like to ride your horse harmoniously?

Knowing how a horse functions biomechanically can help you avoid injuries and lead to a more enjoyable riding experience for both of you. "I see a vast number of problem horses and 'mystery lameness' cases," says Dr Gerd Heuschmann, an equine vet and trainer who travels the world educating vets, riders and trainers on the importance of equine biomechanics and correct training principles. "In many cases, the root cause is a training method that fails to take equine biomechanics into account.

"Understanding a horse's physique is important for any rider if they want a horse that will stay sound, fit, happy and most of all enjoyable to ride. It can also help reduce the number of vet's bills," he says.

According to Gerd, only a few training problems have genuinely medical origins – such as severe kissing spines or orthopaedic issues in the limbs. "In these cases, the horse will try to transfer the weight to the other legs and stiffen the back," he says. "But most ailments begin with bad training leading to back stiffness, and the orthopaedic problem follows."

### So what is biomechanics?

Biomechanics is not a question of training level, breed or discipline; it's a matter of balance. Whether you compete at high levels of dressage, or you prefer hacking

out, balance is always key. In order to achieve balance you need the horse to have a soft contact, soft poll and supple back. In simple terms, you need the horse's body to be in the best position to carry your weight, without bracing his back and instigating all the stiffness problems that result from that.

You need to be in harmony with your horse. "Good, friendly riding starts with a balanced, soft seat and hands," says Gerd. "If you just slouch on the horse as if it were a chair, or with a stiff back, tense legs or a pulling hand, it's highly likely that, unknowingly, you are damaging your horse. Horses are carefully balanced by nature, but when you sit on their back you disturb this equilibrium. We need to

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learn to sit harmoniously on the horse's back without disturbing him – keeping the natural gaits and freedom of movement as much as possible."

### The rollkur factor

If you've picked up an equestrian magazine or visited a horsey website over the past year, you're probably aware of the issue of rollkur. This extreme bending, or hyperflexion, of the horse's neck caused outrage in the horse world, and led to

intervention by the FEI (the international governing body of equestrian sport). It was ruled that flexion of the horse's neck achieved through aggressive force is, quite simply, unacceptable.

Gerd is a key figure in the campaign against rollkur. He was fed up of being the 'repairman' of broken down horses at his equine veterinary practice in Germany, and disillusioned that so many top dressage riders were promoting damaging training techniques. Riders who use rollkur believe they are encouraging the lifting and 'swing' of the horse's back. But, although the technique does cause the back to rise, it also becomes over-stretched, which puts huge tension on the muscles and ligaments of the upper neck. "After years, or sometimes only months, of a horse moving with a forced outline, he can develop career-ending physical and mental problems," says Gerd. Despite the rollkur campaign's success, he believes riders still need to be educated about training their horses harmoniously. "Training should further the horse's capacity to perform, optimise his physical beauty and benefit his overall health and well-being," he says. "Too many horses are being trained in the shortest time possible, using mechanical devices as a shortcut to achieving a desired effect."

### Muscle power

The most 'misunderstood' muscle in the horse is the long back muscle. Many people think this muscle carries the rider's weight, but it actually controls all of the horse's movement. The weight carrying should, in



fact, be done by the neck and hindquarters. If you imagine a horse standing on four legs it's like a bridge, with strong pillars in front and strong pillars behind. When we add our weight to this bridge, the horse needs to distribute it evenly between the four pillars. Training teaches him how to adapt physically to the weight of a rider.

For a horse to develop those crucial long back muscles, he needs to work in a relaxed,

long and low outline. When the horse's head and neck are forward and down – like when he's grazing – the nuchal ligament (which runs from the skull to the withers) and the supraspinous ligament (which attaches to all the vertebrae along the middle of the back) work together to raise the back. This releases the long back muscle, allowing it to swing. "If the way you ride causes your horse to have a tight,

shortened neck, that area can no longer perform its weight-carrying duties. That means the back has to take over the burden, causing it to strain," says Gerd. "Over the years the horse's gaits will eventually be affected as a tight back stops the hindlegs from reaching fully under the horse. The horse's neck functions as an essential lever to raise the

### WAYS TO GET YOUR HORSE WORKING BIOMECHANICALLY



● **WARMING UP** Warm up the horse's muscles gradually and add in a little leg yield or stepping over, which helps to balance the horse.

● **BALANCED SEAT** Learn how to sit softly and be in balance with your horse, not straight, stiff and against the horse. It's useful to spend time riding in a forward seat in trot and canter – stay off the horse's back, with a closed hip angle and the weight dropping into the heel.

● **INDEPENDENT HANDS** Think about riding your horse from the hindquarters forwards with a

carried, soft and giving hand. Most riders who ride from the mouth backwards, by pulling the reins, have deep and demanding hands.

● **DIAGONAL AIDS** The rider needs to learn how the diagonal aids work – from the inside leg into the outside rein – this is very important if you want to use exercises like the leg yield to help balance the horse.

● **LATERAL WORK IN WALK** Stepping over or a little lateral work in walk can help make riders and horses happier if it is performed correctly. Leg yield should be ridden from an independent

seat without pushing with the legs and pulling at the horse's mouth. Keep your hands soft and don't worry about keeping the



horse in a round outline – his nose can be in front of the vertical, but should never drop behind. Ride the horse steadily sideways and encourage him to slowly cross his hindlegs over. This will help the horse's back through improving balance, softness, suppleness and the contact.

Ask your horse to step over while in-hand. This further loosens the horse and familiarises him with the aids on each side of his body.



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back, allowing the long back muscles to work in a relaxed way.

“Every athlete needs development. As a human, if you want to be a weightlifter you need time to build up the required muscles and to find the correct technique to be able to train without damaging your body. The same applies with the training of the horse – it takes time to make him strong and developed enough for his job.”

**Beware of crookedness**

Every horse is naturally crooked. Some horses are hollowed on the left and stiff on the right or vice versa. When a horse is hollowed on the left, he isn’t able to flex

comfortably to the right and will resist pressure on the right rein, often evading the contact, swinging his quarters out and tilting his nose to the left. This occurs because the muscles on the left side of his body are more contracted, making them tight and reluctant to stretch. Working on correcting this stiffness in training can make your horse stronger and more supple.

If a horse is crooked and falling in on the right shoulder when ridden, for example, you risk damage to the right front and hindlegs due to the excess strain. “If the horse is held strongly by the rider’s hand, the problems will be exacerbated and appear sooner,” says Gerd. This can create

bridle lameness – when a horse is sound trotted up in-hand, but lame when ridden. And if enough damage is done, a horse will be unsound even without a rider.

**Common problems**

“Every rider should be aware that the minute he mounts a horse, he becomes a trainer and has a direct influence on how the horse performs,” Gerd says.

An unbalanced position – such as a chair seat (when the rider sits towards the back of the saddle, with the hips behind the vertical line and their legs too far forward), fork seat (when the hips come in front of the vertical line and the legs and knees

slide too far back), backward-thinking hands, too long stirrups or reins that are too long – will all cause you to rely on the reins, stiffen the seat and squeeze the legs together like a clothes peg, creating negative tension in your body which transmits to the horse. “Stiffness in the rider creates stiffness in the horse – it’s a life-long challenge to develop a balanced, soft, friendly seat,” says Gerd.

“The rider’s weight should be distributed evenly over the horse’s centre of gravity, thereby achieving balance. Riders need a soft trunk, soft back muscles and soft abdominal muscles which give the horse a chance to move forwards freely, with energy and swing.

“A correctly working horse looks easy, free, happy and comfortable. The gaits seem natural and full of energy, not stiff, artificial or showy – when it’s right it’s just beautiful to watch.”

● Dr Gerd Heuschmann will be visiting the UK from 6-10 September for a lecture demo and clinics in Oxfordshire. He has also written a book, *Tug of War: Classical versus ‘Modern’ Dressage*, and released a DVD, *If Horses Could Speak*. Tel: (07775) 810 585; email: equinethos@hotmail.com

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**BIOMECHANICS**

- A horse is a flight animal and doesn’t want to run against hard, unyielding hands all the time.
- Nosebands must never be adjusted too tightly – the jaw needs to remain mobile and the horse must be able to breathe easily. Otherwise tension will build that transfers to the entire body.
- The horse needs a leader he can trust and not someone who is trying to dominate. If the horse is afraid of you he will stiffen his body instead of relaxing and working with you. Be his friend and make him trust you, remain the boss but be friendly and positive while in control.
- Every horse, whatever discipline he competes in, should be allowed to jump fences, hack out, climb hills and go through rivers. These activities are good for both the brain and the body.
- Hill work is the cheapest chiropractic treatment available for horses.
- Time spent in the field is vital – with friends and in larger areas so the horse is encouraged to move freely and play with others.
- Feeding hay from the floor is important as it makes the horse bring his back up. This is the way that horses were designed to eat.
- When a muscle is tired, there is no positive training effect. Sore muscles become tense and are at risk of damage.
- It takes one-and-a-half to two years to develop the young horse’s muscle system for a future career as a riding horse – using a varied routine of gymnastic work. ■



Photograph: Candida Von Braun. Horse recommends that you always wear an up-to-standard hat when riding.