

Why is it important to see sports horses ridden?

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Many riders experience performance-related problems during ridden exercise. It is vital to recognise the problems that the rider is experiencing when they ride the horse. Ridden exercise is crucial, because there are some lamenesses, both forelimb and hindlimb, that are only apparent ridden [1]. A baseline lameness seen in hand or on the lunge may have no relevance to the horse's performance when ridden.

Ideally the horse should be assessed ridden by its normal rider in its usual tack. The fit of the tack should be assessed. The skill and balance of the rider and their size relative to the horse should be noted. It is important to recognise that a rider can potentially induce lameness by overly restricting the horse via the reins and failing to ask the horse to go forwards with sufficiently strong seat and leg aids. A rider who is poorly balanced, has poor core strength, or moves out of synchrony with the horse's gait can create irregularities of the horse's gait. A rider who is both large for a horse and out of balance can inhibit the movement of the horse's thoracolumbar region with secondary changes in limb flight. A rider who is constantly moving their hands may induce movement of the horse's head and neck, which sometimes may mimic lameness. A good rider can mask problems by making subtle readjustments to the horse's balance and by riding the horse forward strongly. A horse which only experiences problems when doing advanced collected work, especially lateral work, may not show its problems unless ridden by a rider capable of producing that level of collection.

The horse should work through the movements which it would normally do in training and competition. This should include walk, trot and canter, upwards and downward transitions and lateral movements depending on the horse's level of training. Working, collected, medium and extended trot and canter should be assessed. If the horse has experienced problems when jumping (e.g., jumping to the right, failing to land with the left forelimb leading) it should be assessed jumping.

With any horse it can be helpful to see the horse ridden in 10 m diameter circles at the trot, and circular figures of eight i.e., linking 10 m circles to the left and to the right alternately. The circle diameter is crucial because larger circles are too easy. It is quite remarkable how a horse may maintain a normal posture and rhythm in a circle of 12 m diameter, but look very different on a circle of 10 m diameter. Loss of rhythm, becoming overbent or more overbent, going above the bit, leaning in, crossing the inside hindlimb under the trunk during protraction, being more difficult to turn in one direction compared with the other may also reflect an adaptation to pain.

The horse and rider should be viewed coming toward and going away from the examiner, and from the side. This means that the horse is best assessed from two corners of the arena. If the saddle continually slips to one side on one rein this is usually a reflection of hindlimb lameness [2,3]. However, it could be the result of an ill-fitting or asymmetrically flocked saddle, asymmetry of the thoracolumbar musculature or rider crookedness. Bear in mind that saddle slip secondary to hindlimb lameness may induce rider crookedness.

Pay attention to the diagonal on which the rider sits during rising trot. It is convention that the rider should sit when the inside hindlimb and outside forelimb are bearing weight. With hindlimb lameness a horse usually appears lamer when the rider sits on the diagonal of the lame limb. Some horses may alter their gait and hop to try to displace the rider to sit on the diagonal of the none-lame or less lame hindlimb.

Compare the horse's posture and rhythm in rising trot and sitting trot. A horse with thoracolumbosacral pain may reduce the range of motion of the vertebral column i.e., stiffen its back, in sitting trot, and become slightly above the bit. Ask the rider if they feel any differences in the gait between rising and sitting trot. Consider the relative quality of the trot and the canter. The quality of canter in horses with sacroiliac joint region pain is usually worse than trot [4]. The clinical features of sacroiliac joint region pain are usually dramatically worse in a ridden horse than under other circumstances.

In some horses the quality of canter may be consistently worse on one rein (e.g., left rein) compared with the other (e.g., right rein) which may reflect asymmetrical pain. The rider may feel jarred by the horse (i.e., there is a high impact transmitted through the rider's seat and back), or may feel that their pelvis is being rotated. The horse may reduce the range of motion of the thoracolumbosacral region as an adaptation to lameness, so that the rider will comment that the horse feels 'solid behind the saddle' [5]. Flying changes are physically more demanding for the hindlimbs than maintaining canter on the same lead, and difficulties in performing changes correctly may highlight the presence of pain.

With collected paces the horse has to engage the hindlimbs more than in working trot, with the centre of gravity moved caudally and more weight being carried by the hindlimbs. Obviously this is more demanding than working trot and may be the only occasion when resistances are recognised. Lateral work requires collection and increases the rotational forces on the trunk and limbs

How should a horse work correctly?

Based on the principles of training, an event horse or a dressage horse should ideally work 'on the bit' [6,7]. The cranial aspect of the head should be in a vertical position, with the neck flexed at the poll i.e., flexion of the cranial cervical vertebrae. The horse should accept the bit, taking an even contact via the reins on the rider's hands (i.e. equal rein tension), keeping the mouth shut and producing saliva. The horse should be pushing energetically with the hindlimbs, *tracking up*, with the hindlimbs following the tracks of the forelimbs (i.e., on two tracks). There should be flexion at the lumbosacral joint, and fluid movement through the horse's thoracolumbosacral region [8]. The horse's trunk should be more or less vertical in both straight lines and circles, with the trunk curved to follow the radius of curvature of a circle [9, 10]. The horse should be in balance with proportionate weight distribution between the forelimbs and hindlimbs. The horse should move willingly forward, being responsive to the rider's aids. The best showjumping riders work their horses similarly, however at lower levels there is much less attention paid to correct balance and bend. A horse which has undergone correct basic training should be able to work correctly.

Horses' responses to musculoskeletal pain

Resentment of being tacked up, manifest as the horse moving to the back of the stable as a rider enters with the tack, or laying the ears back, swishing the tail and attempting to bite or

kick as the girth is tightened, may reflect discomfort induced by the tack, anticipation of pain associated with being ridden or gastric ulcer syndrome. Many musculoskeletal problems causing poor performance are slow and insidious in onset. How pain is manifest when ridden depends on the temperament of the horse and its tolerance of pain. Unwillingness to go forward freely (not because of lack of fitness, or cardiovascular or respiratory problems, or other systemic illness), so-called laziness and lack of power are typical findings. However there is a group of horses in which pain is manifest as tension, 'buzziness', hurrying or wanting to run away, sometimes with disproportionate sweating relative to the work done and the horse's fitness. The horse may become less compliant and responsive to the aids, become spooky (shying repeatedly) and evade the aids (cues given by the rider) by putting the tongue over the bit or putting the head up (going *above the bit*), or twisting the head and neck. A horse may start to buck or rear [11-15].

Pain often causes a generalised restriction of movement, with reduced range of motion of the cervical and/or thoracolumbosacral regions and shortened steps. The horse may fail to *track up*. The horse may become more difficult to turn in one direction, especially in small (10m diameter) circles. A horse which had been similar to ride on both the left and right reins may have a deterioration in performance on one rein. A horse which formerly took a good quality, even contact with the bit may change by leaning on one side of the bit so giving a stronger pull (hanging) on the rein in the rider's hand, and avoiding taking a proper contact via the other rein. Alternatively a horse which is *on the forehand* because of inadequate hindlimb impulsion may lean on both reins and be very heavy in the rider's hands. Many horses evade by becoming *overbent* or *behind the bit*, often reducing the weight of the contact in the rider's hands. Other horses evade by becoming *above the bit*. The tongue may loll out of the horse's mouth, or the horse may constantly hold its mouth open or repeatedly chomp the teeth, or tooth grind. The mouth may be dry, lacking salivation. Pinning the ears back, flaring the nostrils and constant swishing of the tail are often signs of pain [11-15]. Application of a Ridden Horse ethogram has shown that the presence of $\geq 8/24$ behavioural markers is likely to reflect the presence of musculoskeletal pain [13,15]. Abolition of musculoskeletal pain by diagnostic analgesia \pm alteration of tack results in significant reduction in the behaviour score to < 8 [15].

A low-grade forelimb lameness may result in the horse taking slightly lame steps on turns, sometimes only in one direction. If bilateral, the horse may take symmetrically short steps with both forelimbs in all paces. A horse with hindlimb lameness may fail to push properly with the hindlimbs in upward transitions from walk to trot or from trot to canter and may therefore appear to 'jump' in the transition. The horse may be reluctant to flex the lumbosacral joint and *engage* the hindlimbs in downward transitions so the horse may become more on the forehand, be croup high and fall abruptly from canter to trot or from trot to walk, taking short steps with the hindlimbs. With hindlimb lameness it is typical that there are difficulties in movements requiring more *collection* e.g., *lateral movements* (shoulder-in, travers, half pass, walk or canter pirouettes). With either forelimb or hindlimb lameness irregularities in the rhythm or asymmetries in limb flight may become apparent in *medium* and/or *extended trot*. For example, one forelimb may be elevated less than the other during protraction.

Although lameness cannot be detected in canter a change in the quality of the canter may be a reflection of pain e.g., lack of a suspension phase, a so-called *four time canter*; stiff and stilted canter \pm close temporal and/or spatial placement of the hindlimbs; cantering crookedly, with the hindlimbs not following the same tracks as the forelimbs (usually with

the hindquarters displaced to the inside of the track if working in an arena). The canter may become *disunited* or the horse may repeatedly *change limbs behind* (also referred to as changing leads behind). The horse may be reluctant to canter with one forelimb leading. This usually reflects hindlimb pain: with right hindlimb pain the horse may be reluctant to canter with the left forelimb leading, because left lead canter is initiated by the horse weight bearing on the right hindlimb alone. Less commonly unwillingness to lead with one forelimb is a manifestation of forelimb pain. The horse may show difficulties with *flying changes* from left to right or right to left or both, seen as reluctance to change, being croup high in the changes, leaping into the changes, or being crooked with the horse swinging excessively from side to side. These abnormalities usually reflect hindlimb pain. With forelimb pain the horse may have reduced height of the arc of the foot flight of the forelimbs in canter and paradoxically appear to land more heavily on the forelimbs than a normal horse. The forelimb gait can also change as a reflection of primary hindlimb pain.

Specific problems may be seen when a horse is jumping. The horse may fail to land with the correct limb leading i.e., the leading limb should be on the same side as the direction to which the horse is turning. On landing there is greater ground reaction force in the trailing forelimb compared with the leading forelimb. So with right forelimb pain the horse may repeatedly land with the right forelimb leading even when turning to the left if the biggest component of pain relates to impact. However if pain is associated with extension of the right fetlock and increased load on the suspensory apparatus the horse may prefer to always land with the left forelimb leading. Uncharacteristic stopping at fences or running out may relate to either forelimb or hindlimb pain. Horses with forelimb pain may be reluctant to jump going downhill. They may also show reluctance to gallop downhill. Lack of power and difficulties in making distances in combination fences usually reflect hindlimb pain. If a horse jumps crookedly across a fence, for example jumping from left to right, this usually reflects pain in the hindlimb on the same side to which the horse is jumping, because the horse creates less propulsion from the lame(r) limb. Having rails down uncharacteristically may reflect forelimb or hindlimb pain.

In conclusion, failure to see sports horses ridden may result in completely erroneous conclusions. It is crucial to understand the way in which ridden horses may adapt their gait and behaviour in the face of musculoskeletal pain.

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