The importance of saddle fitting

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Contents

Introduction

Traditionally made of wood, the saddle is a solid structure around which it is constructed (Belock, Kaiser, Lavagnino, & Clayton, 2011, para. 1), varying in the length and width of the tree, the padding surface and the angle of the lateral parts of the tree (Meschan, Peham, Schobesberger, & Licka, 2007, p. 578).

Unfortunately, saddles are often sold with little knowledge towards correct saddle fit and minimal or no consideration towards the consequences of poor fit (Fruehwirth, Peham, Scheidl, & Schobesberger, 2004, p. 754). Furthermore, traditional saddle-fitting methods are often performed on a standing horse alone (Fruehwirth et al., 2004, p. 754) without taking into consideration the important aspect of whether or not a horse can move easily and freely under a rider (Fruehwirth et al., 2004, p. 756).

Musculoskeletal injuries and back pain as a result of poor saddle fit (Jeffcott, Holmes, & Townsend, 1999, p. 113; Harman, 1999, p. 248) contributes to poor welfare and health (McGreevy, McLean, Buckley, McConaghy, & McLean, 2011, p. 531), leading to an enormous wastage of horses, loss of performance and increased costs to the industry (Harman, 1999, p. 247).

This report aims to underline the importance of saddle fit and its impact on equine locomotion. The influence of a rider on horse performance will also be discussed.

Saddle fitting

Correct saddle fit may best be described as the lowest overall force at different gaits, together with a pressure distribution without pressure peaks (Meschan et al., p. 582). It enables the rider to be balanced and centred on the horse, does not interfere with the rider’s aids and makes the rider feel secure, allowing for clear communication and peak performance (Harman, 1999, p. 247).

Position of the saddle

The most critical aspect of saddle fit is the position of the saddle. If a saddle is placed where it should naturally rest, behind the horse's shoulder blades, it should stabilise itself. Saddles placed too far forward can influence a horse's natural movement and can imbalance the rider. The rider's weight can become centred over areas that are not designed to carry weight such as the lumber spinal region of the horse and the last few ribs. When the correct position is found, the seat of the saddle should be level and the rider should feel balanced (Harman, 1999, p. 253).

Tree fit

The saddle tree must have the same shape as the horse's withers – too narrow and it creates pressure points, too wide and it can pitch the rider's weight forward, injuring the dorsal aspect of the withers (Harman, 1999, p. 254).

Bars/panels

The angle of the bars/panels need to follow the angle of the horse's back under the cantle, to avoid creating pressure points at the horse's shoulders or at the rear of the saddle. As the osseous vertebral column is not designed to carry weight, the spinous processes need complete freedom from pressure and the vertebral column needs to flex up and down as well as sideways. For this reason, the gullet, needs to be wide enough so as not to interfere, and must sit squarely on the horse's back muscles (Harman, 1999, p. 255)

Girth/cinch

The girth attaches to the narrowest point of the rib cage; therefore it is important that the girth attachment on the saddle lines up with the narrowest part of the horse's chest. If not positioned correctly, the saddle will move forwards and backwards until its natural spot is found (Harman, 1999, p. 255).

Computerised saddle fitting

Computerised saddle fitting, using pressure matts with built-in electronic sensors (Belock et al., 2011, para. 3), allow an objective evaluation of saddle fit during locomotion (Kotschwar, Baltacis, & Peham, 2010, p. 114). The pressure mat can transmit data wirelessly to a computer, enabling saddle force and pressure to be recorded at various gaits and speeds, when the shape of the horse's back and the forces applied by the rider are continually changing (Belock et al., 2011, para. 3).

The software is able to calculate the force over an array of sensors and will display the pressure distribution over the entire surface area of the mat, defining temporal and spatial distribution of high pressure areas (Geutjens, Clayton, & Kaiser, 2008, p. 332). Localised areas of high pressure is taken as an indication of poor saddle fit (De Cocq, Clayton, Terada, Muller, & Van Leeuwen, 2009, p. 272).

Consequences of a poor fitting saddle

A poor fitting saddle compromises natural movement by restriction and excessive pressure (McGreevy et al., 2011, p. 533) leading to discomfort and pain (Kotschwar et al., 2010, p.114), significantly effecting a horse's life during and after a training session (McLean & McLean, 2008, p. 54). Overly tight or inappropriately fitting equipment associated with saddles such as cinches, breast-plates and girths, can also compromise a horse's athletic performance (McGreevy et al., 2011, p. 534), behaviour and musculoskeletal health (McGreevy et al., 2011, p. 533).

With girths in particular, it is recognised that over tightening can compromise thoracic excursions and therefore affect athletic performance (McGreevy et al., 2011, p. 534). A horse can also produce a counter-predator reaction when an inappropriately loose or tight saddle is making contact with damaged or highly sensitive tissue (McLean & McLean, 2008, p. 48).

It is not clear whether or not 'cold back', a syndrome of persistent hypersensitivity with temporary stiffness and dipping of the spine when being saddled, is actually painful, associated with previous back pain or temperamental behaviour (Jeffcott, 1980, p. 208). It is known however that soft tissue injuries are an important cause of back pain. In horses with back pain, 25% have muscle damage and ligamentous strain and are often related to ridden exercise (Jeffcott, 1980, p. 204). The muscle and ligament pain could be caused or made worse by the pressure that a saddle and a rider put on the muscles (De Cocq, Van Weeren, & Back, 2004, p. 758).

Kissing spine syndrome (KSS) is a common bony pathological condition involving crowding and overriding of the dorsal spinous processes (De Cocq et al., 2004, p. 758). The saddle bearing area, between the 12^{th} and 18^{th} vertebrae is where lesions are most commonly detected (Jeffcott, 1980, p. 204). Weight bearing and other stresses inflicted on horses by the rider is thought to be one of the causes of KSS (De Cocq et al., 2004, p. 753).

Communication between horse and rider can also be affected by a poorly fitting saddle due to the restriction of the free lateral excursion of the horse’s back, impairing the capability of the horse to use regular and consistent movement. The horse is forced to seek relief when moving, automatically changing the motion pattern (Peham, Licka, Schobesberger, & Meschan, 2004, p. 670). A study by Fruehwirth et al., (2004) showed that if a saddle provoked localised pressure concentrations, the forward swing of the horse’s leg was terminated and the stride length decreased (Fruehwirth et al., 2004, p. 756).

Interestingly, a poor fitting saddle not only affects the musculoskeletal health of the horse, but the rider as well. In a study by Quinn & Bird (1996), riders using a General Purpose (or English) saddle for 15 years or more, suffered three times the rate of lower back pain than those who rode in Western saddles. The additional support, postural position and cushioning offered by the design of a deep seated Western saddle may have contributed to the lower incidence of back pain (Quinn & Bird, 1996, p. 144).

Influence of the rider

To perform at full potential, it is essential for both the human and equine athlete to be comfortable. Correct saddle-fit ensures that the saddle conforms to the shape of the horse's back on the underside and the shape of the rider's pelvis on the upper side (Belock et al., 2011, para. 2).

Load distribution transmitted to a horse's back is determined by saddle construction (Latif, Peinen, Wiestner, Bitschnau, Renk, & Weishaupt, 2010, p. 634). The saddle determines the stirrup position whereas its position on the horse's back defines the deepest point of the seat. Stirrups that are too far forward or too short, place the rider in a chair-seat position (Latif et al., 2010, p. 633) which means that the centre of gravity is shifted, increasing the force distribution in the area toward which the rider is leaning (De Cocq et al., 2009, p. 271).

In the stance phase when measuring transverse motion, the shift of the thoracic spine towards the front leg indicates that the forelimb is the primary support for the horse's trunk while in motion (Licka, Peham, & Zohmann, 2001, p. 1178). Adding the rider's weight has been shown to cause lateral stiffness in the thoracic region of the horse's back (Peham & Schobesberger, 2004, p. 704), as well as change the horse's stride by lengthening the supportive phase and shortening the suspension phase (Benton, 2006, p. 8).

Different saddle types used for various disciplines also play a vital role in rider position and equine locomotion. When Thoroughbred race horses are ridden at the gallop, 90% of the load is concentrated around the withers as a result of the rider standing in the stirrups and pressures towards the rear of the saddle increases when performing the rising trot (Latif et al., 2010, p. 633). As racing saddles are commonly placed too far forward, the movement of the horse's front legs is affected, shortening the stride, which places the rider out of balance and causes them to rely on the reins for balance (Harman, 1999, p. 254). Treeless saddles used for endurance or recreational riding have also shown to have an increased pressure concentration under the middle third of the saddle beneath the rider's seat bones as well as higher maximal pressures when performing the sitting trot compared to conventional saddles (Belock et al., 2011, para. 22). Riding in a treeless saddle has been compared to riding bareback, however on a wide horse it can be difficult for the rider to keep their pelvis and hips in the correct position, increasing the chance of interference and miscommunication (Harman, 1999, p. 254).

The right combination of horse and rider enables the horse to cope with the weight and physical demands through thoracic, thoraco-lumbar and lumbo-sacral flexion, concentric contraction of abdominal muscles and of the long muscles of the neck (Denoix & Pailloux, 1997, p. 36 & 50). A professional rider who follows the movements of the horse, allows the horse to execute various movements with harmony, lightness and ease, better than what a recreational rider can (Peham, Licka, Kapaun, & Scheidl, 2001, p. 100).

Conclusion

During locomotion, a horse's back moves by rotation, flexion, extension and lateroflexion (Denoix & Pailloux, 1997, p. 34-39). A conventional saddle, designed to support the rider's position and distribute the rider's weight across the musculature on either side of the thoracic midline (McGreevy et al., 2011, p. 534), aims to provide comfort for both horse and rider, therefore reducing restriction of natural movement and excessive pressure (McGreevy et al., 2011, p. 533).

Poor fitting saddles can create a number of issues for the horse including back pain (Jeffcott et al., 1999, p. 113), muscoskeletal injuries, behavioural problems (McGreevy et al., 2011, p. 534) and miscommunication from the rider (Harman, 1999, p. 247). A poor fitting saddle, without the appropriate support, postural position and cushioning, if used long term, can also cause the rider back pain (Quinn & Bird, 1996, p. 144).

The weight and position of a rider also has a significant influence on force distribution (De Cocq et al., 2009, p. 271) resulting in increased pressure distribution. This has shown to cause lateral stiffness in the thoracic region of the horse's back (Peham & Schobesberger, 2004, p. 705), hollowing of the back, unsymmetrical gaits and an adjustment of the horse's stride by shortening the suspension phase (Benton, 2006, p. 8).

To improve a horse's movement when being ridden, the ability of the rider needs to be considered. The right horse-rider combination who moves in harmony and with lightness and ease allows for better athleticism. Such movements are better executed by a professional rider rather than a recreational rider (Peham et al., 2001, p. 100).

In conclusion, horse riding can have a significant impact on a horse's welfare by affecting musculoskeletal health, behaviour and gait biomechanics (McGreevy et al., 2011, p. 531). Correct saddle fit and the right horse-rider combination allows for better natural movement (McGreevy et al., p. 533) and is therefore vital for a horse to cope with the physical demands of various professional and/or recreational equine activities.

References

Belock, B., Kaiser, L.J., Lavagnino, M., & Clayton, H.M. (2011). Comparison of pressure distribution under a conventional saddle and a treeless saddle at sitting trot. *The Veterinary Journal*. doi: 10.1016/j.tvjl.2011.11.017

Benton, K.M. (2006). The effect of increasing a rider's weight on a horse's stride. *University of Tennessee Honors Thesis Projects.* Retrieved from http://trace.tennessee.edu/utk_chanhonoproj/934

De Cocq, P., Van Weeren, P.R., & Back, W. (2004). Effects of girth, saddle and weight on movements of the horse. *Equine Veterinary Journal*, 36(8), 753-765.

De Cocq, P., Clayton, H.M., Terada, K., Muller, M., & Van Leeuwen, J.L. (2009). Usability of normal force distribution measurements to evaluate asymmetrical loading of the back of the horse and different rider positions on a standing horse. *The Veterinary Journal*, 181, 266-273.

Denoix, J.-M., & Pailloux, J.-P. (1997). *Physical therapy and Massage for the Horse.* London: Manson Publishing.

Fruehwirth, B., Peham, C., Scheidl, M., & Schobesberger, H. (2004). Evaluation of pressure distribution under an English saddle at walk, trot and canter. *Equine Veterinary Journal*, 36(8), 754-757.

Geutjens, C.A., Clayton, H.M., & Kaiser, L.J. (2008). Forces and pressures beneath the saddle during mounting from the ground and from a raised mounting platform. *The Veterinary Journal*, 175, 332-337. doi: 10.1016/j.tvjl.2007.03.025

Harman, J. (1999). Tack and saddle fit. *The Veterinary Clinics of North America*, 15(1), 247-261.

Jeffcott, L.B. (1980). Disorders of the thoracolumber spine of the horse – a survey of 443 cases. *Equine Veterinary Journal*, 12(4), 197-210.

Jeffcott, L.B., Holmes, M.A., & Townsend, H.G.G. (1999). Validity of saddle measurements using force-sensing array technology – preliminary studies. *The Veterinary Journal*, 56, 113-119.

Kotschwar, A.B., Baltacis, A., & Peham., C. (2010). The effects of different saddle pads on forces and pressure distribution beneath a fitting saddle. *Equine Veterinary Journal*, 42(2), 114-118. doi: 10.2746/042516409X475382

Latif, S.N., Peinen, T., Wiestner, C., Bitschnau, C., Renk, B., & Weishaupt, M.A. (2010). Saddle pressure patterns of three different training saddles (normal tree, flexible tree, treeless) in Thoroughbred racehorses at trot and gallop. *Equine Veterinary Journal*, 42(38), 630-636. doi: 10.111/j.2042-3306.2010.00237.x

Licka, T.F., Peham, C., & Zohmann, E. (2001). Treadmill study of the range of back movement at the walk in horses without back pain. *American Journal of Veterinary Research*, 62(7), 1173-1179. doi: 10.2460/ajvr.2001.62.1173

Meschan, E., Peham, C., Schobesberger, H., & Licka, T.F. (2007). The influence of the width of the saddle tree on the forces and the pressure distribution under the saddle. *The Veterinary Journal*, 173, 578-584. doi: 10.1016/j.tvjl.2006.02.005

McGreevy, P., McLean, A., Buckley, P., McConaghy, F., & McLean, C. (2011). How riding may affect welfare: What the equine veterinarian needs to know. *Equine Veterinary Education*, 23(10), 531-539. doi: 10.1111/j.2042-3292.2010.00217.x

McLean, A., & McLean, M. (2008). *Academic horse training: Equitation science in practice*. Clonbinane: Australian Equine Behaviour Centre.

Peham, C., Licka, T., Kapaun, M., & Scheidl, M. (2001). A new method to quantify harmony of the horse-rider system in dressage. *Sports Engineering*, 4, 95-101.

Peham, C., Licka, T., Schobesberger, H., & Meschan, E. (2004). Influence of the rider on the variability of the equine gait. *Human Movement Science*, 23, 663-671. doi: 10.1016/j.humov.2004.10.006

Peham. C., & Schobesberger, H. (2004). Influence of the load of a rider or of a region with increased stiffness on the equine back: a modelling study. *Equine Veterinary Journal*, 36(8), 703-705.

Quinn, S., & Bird, S. (1996). Influence of saddle type upon the incidence of lower back pain in equestrian riders. *British Journal of Sports Medicine*, 30, 140-144.