

Equine training aids: can they really improve performance?

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Abstract:

The use of training aids within equine training programmes is well established across professional, amateur and recreational riders, and horse owners. Despite this, the claims of training aid manufacturer's to promote equine muscle development, gait characteristics, proprioception and the horse's biomechanics have not been evaluated scientifically. The impact of training aids on equine behaviour and welfare is also limited. As a result, horse owners, trainers and veterinary professionals wishing to employ an evidence informed approach to training aid use have restricted resources they can consult. This review considers factors operators should evaluate when using training aids and explores the evidence base available to help support an ethical approach to equine training and rehabilitation.

Key words: equestrian sport, horse training, rehabilitation, schooling, lunging

Key points:

1. Few studies have scientifically evaluated the impact of training aids on equine biomechanics, behaviour or muscle development
2. When using equine training aids, operators should assess if the aid works in line with the principles of learning theory
3. More studies are required to fully understand the short and long term impact of training aids on equine performance across different gaits and levels of horse experience
4. Regular and objective assessment of individual horse progress within training or rehabilitation programmes should underpin continued use of training aids

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Introduction

Equestrianism is popular worldwide, with millions of horses and riders participating in competitive horse sports and non-competitive leisure riding (Williams and Tabor, 2017). Across equestrian disciplines, training aids have become commonplace pieces of equipment that can be found in the tack rooms of professional, amateur and recreational horse owners alike. Yet despite their popularity and the anecdotal claims of their beneficial effects made by manufacturers, limited studies have evaluated the impact of training aids on equestrian performance.

Horse riders, owners and trainers have a moral and legal duty of care to engage in practices which optimise equine health and welfare, and that promote ethical equitation practices (McLean and McGreevy, 2005). This responsibility includes ensuring that tack and equipment, such as training aids, are used in an ethical manner that does not endanger the safety or welfare of horses (or the human handlers / riders involved) (Hawson et al., 2010; Williams and Marlin, 2020). However to be able to develop and utilise ethical and sustainable ethical equestrian practices, rider and handlers using training aids require a fundamental understanding of how to use these aids correctly, how specific aids function and their action on the horse. Alongside this, knowledge of the potential impact of different pieces of equipment on equine welfare and performance is also required to enable selection of the right piece of equipment to achieve set training or rehabilitation goals, and to be able to use the equipment safely (Waran and Randle, 2017; Williams and Tabor, 2017). Few training aids when purchased come with detailed guidance on how to fit and use the device, and very few discuss how they should be integrated into a training or rehabilitation regime, or how to monitor if their use is beneficial to the horse. Therefore the onus is placed on the horse rider / handler to judge if they are skilled enough and their horse's level of training is sufficiently advanced to be able to respond positively to the use of the training aid. While many equestrians are proficient at using training aids, it has been recognised that a substantial proportion of equine welfare issues reported around the world are associated with unintentional neglect due to owner or rider ignorance (Hemsworth et al., 2015). Marlin et al. (2018) also reported equestrians had inflated confidence in their equine related knowledge and demonstrated the Dunning Kruger effect,

regardless of qualification level. These inherent issues combined could result in individuals utilising equine training aids inappropriately and unintentionally compromise their horse's welfare and / or performance.

This review will consider the function of equine specific training aids in relation to the principles of training for improved performance or as part of a targeted rehabilitation programme, to support informed decision-making in horse owners and riders when selecting if it is a) appropriate to use a training aid and b) if so, evaluating which training aid may be suitable for their horse.

Defining a training aid

To be able to evaluate the impact of a training aid on a horse, we first need to define what constitutes a training aid and to understand the principles of training and rehabilitation, which underpin the rationale for using a training aid. Training is defined as '*the action of teaching a person or animal a particular skill or type of behaviour*' or '*the action of undertaking a course of exercise and diet in preparation for a sporting event*' (OED, 2020). An aid is considered '*a source of help or assistance, typically of a practical nature*'. Therefore an equine training aid would be any piece of equipment that aims to practically help or assist the horse develop a particular skill or exercise. The use of an equine training aid may then have subsequent benefits such as placing the horse in a way of going that promotes muscle development, enhances symmetry or improves the horses' quality of work. A key area to consider when using training aids is **how** the horse reacts to working with the training aid and if this imposes any restrictions on the horse's behavioural repertoire (Merkies et al., 2018), and as a result if we are promoting a positive or negative learning experience for the horse (McGreevy and McLean, 2009). A working knowledge of learning theory is essential for individuals working with horses. Generally horse training can be divided into two categories: positive reinforcement for example, presenting a food reward to the horse after it demonstrates the desired behaviour to increase the likelihood of the horse performing that behaviour in the future from the same aid; or negative reinforcement, where the (usually aversive) stimulus is removed in response to the desired behaviour e.g. removing leg pressure when the horse moves forward to increase the likelihood of the horse repeating the same response to the leg in the future (Merkies et al., 2018; McGreevy and McLean, 2009). For learning to be effective, the rider

or handler must be able to give clear signals and respond quickly, within 1-2 seconds, when the horse offers the 'correct' response or behaviour, for the horse to link the stimulus to the response we are aiming for. Therefore to use training aids responsibly, the handler or rider must consider the mechanism of action of the equipment, how skilled they are in working the horse within the aid, and how the horse will interpret and learn from the use of the equipment. For example, the persistent use of draw reins will likely result in a lowered head and neck position through a pulley action, but this will not teach the horse to work in self-carriage if there is no removal of pressure to teach the horse the desired response to the rein aid (McLean and McGreevy, 2010a,b; Merkies et al., 2018).

Goals of training using aids: performance versus rehabilitation

The key objective of equestrian training regimes is to prepare the horse (and rider) for the physiological and psychological demands of the work expected of the horse (usually competition) to prevent injury and optimise performance (Table 1). A successful training regime will include a combination of exercise types which are mapped to performance goals and combined with regular assessment of progress (Williams, 2013). Training aids are generally integrated into equine training programmes to promote performance via skill acquisition, muscle conditioning and balance to enhance the horse's quality of movement. Training aid use within exercise regimes should be gradually introduced both in terms of frequency, intensity and duration of use but also with reference to the skill level applied, to make sure the horse is not expected to work at a gait or in a way of going which is beyond its current fitness, skill or experience level. Equally, the efficacy of the aid to achieve the desired goal should be regularly and objectively assessed by the handler or rider. For example, working a horse that has been recently backed in the Pessoa Training Aid set to the advanced head and neck position would be inappropriate as this level of self-carriage requires the horse to be comfortable and have sufficient muscle development to work in an advanced, collected frame. The same principles should be applied when selecting training aids for use in rehabilitation programmes, alongside evaluation of whether the action of the training aid will achieve rehabilitation goals set.

Table 1: Key objectives of equine training (Williams, 2013)

Objective 1	Preparing for work / competition: physiological conditioning to ensure adequate fitness and prevent fatigue
Objective 2	Improving performance: development of a balanced athlete and task-specific conditioning, motor skill acquisition and achievement of 'expertise' through improved neural plasticity
Objective 3	Preventing injury and increasing career longevity: via adequate preparation of the horse and rider

Exercise therapy is a key component in rehabilitation in equine physiotherapy; however, only limited evidence is available for the use of exercises and training aids in rehabilitation of the equine athlete (Tabor and Williams, 2017). The main goal of rehabilitation is to return the horse to its previous level of performance and exercises incorporated into rehabilitation regimes aim to progressively improve the horse's proprioception, neuromuscular control, and load and strengthen musculoskeletal tissues to ultimately increase performance of the horse as a whole (Tabor and Williams, 2018). A short term adaptive response, generated by fatigue and mild cellular damage in the targeted muscles, is required during exercise sessions to stimulate muscular hypertrophy, and this increased level of stress needs to continue progressively across a training programme (Tabor and Williams, 2018). However, our knowledge of what level of exercise and therefore required loading on the muscular tissues to stimulate adaption is anecdotal at best (Tabor and Williams, 2018). Initially, exercises in straight lines and on a horizontal plane are often indicated in equine rehabilitation regimes, and the exercise prescription will then often progress to include lunging on a circle or ridden work. Research reports increasing speed or integrating work on an incline within exercise has a beneficial impact on development of key muscles associated with locomotion: longissimus dorsi, gluteus medius, tensor fasciae latae, biceps femoris and the abdominal muscles (Tabor and Williams, 2018). During rehabilitation, the use of training aids is often advocated yet as the precise effect of most training aids on the locomotory muscles is limited, the choice of aid and how these are used has to be pragmatic based on the type and severity of injury as

well as the goal/s of rehabilitation. Regular assessment and discussion of progress within rehabilitation programmes is also essential. This should be aligned to established goals and be undertaken with the horse's physiotherapist and veterinary surgeon to ensure exercises selected are having a beneficial effect on the horse's recovery.

The existing evidence base for training aid use

Equestrian practice has its foundation in tradition, with many training and management practices based on anecdotal and historic methods rather than scientific evaluation of their effectiveness (McLean and McGreevy, 2010a; Williams and Tabor, 2017). In contrast contemporary approaches in equestrianism advocate an evidence-informed approach to equine training and management. Using an evidence-informed approach encourages individuals to use the best evidence possible when making decisions about the methods, treatments and actions employed to achieve their goals, thus enabling them to form a moral judgement as to whether their decision making is ethical to optimise equine welfare (Waran and Randle, 2017; Marlin and Williams, 2020).

Equine training aids are often used to influence the horse's head and neck position and by default to impact spinal kinematics and stride length (Rhodin et al., 2005, 2009; Gómez Álvarez et al., 2006) or to increase engagement of the horse's core musculature and hind limbs to improve propulsion or generate muscle recruitment or hypertrophy (Dyson, 2017). Many different equine training aids are available for use by horse owners (Table 2). However the evidence base related to equine training aids is limited and studies to date tend to focus on the short term effects of training aids on equine kinematics, gait and muscle activity. Moving forwards, further research is needed across the spectrum of the different tools available and in relation to different contexts: horse and human experience, short and long term influence of specific training aids in relation to performance and rehabilitation goals to develop a detailed foundation for horse owners, riders and trainers to base their practice upon.

Draw reins

The use of draw reins in certain equestrian disciplines such as show jumping can be regularly observed (Murphy et al., 2008). Draw reins act as levers and increase the effect of the rider's hand; they are used to increase collection by shifting the horse's centre of gravity caudally, thereby increasing weight-bearing on the hind limbs, as well as developing increasing suppleness in the head and neck by facilitating lateral flexion (Roepstorff et al., 2002). It is important that riders, trainers and veterinary professionals understand the action of draw reins when selecting them for use to improve a horse's performance or recommend they be used within rehabilitation regimes. Studies have shown that the while the use of draw reins alone can facilitate reduced head and neck angles, to generate the desired effect of increased collection characterised by higher impulses in the hind limb and increased flexion of the hock and extension of the hip joint, the combined use of draw reins with normal reins is required (Roepstorff et al., 2002; Bystrom et al., 2006). Therefore draw reins should only be used in conjunction with the horse's normal rein incorporating pressure-release and not persistent contact to enhance performance in the ridden horse.

Side reins

Side reins are often used when lunging horses within equine training programmes; the reins restrict and restrain the position and movement of the horse's head and neck, and influence the movement of the back and stride characteristics. Rhodin et al. (2005) demonstrated that when the horse's head and neck were restrained in a high position, stride length and flexion and extension of the caudal back were significantly reduced. The use of side reins is also anecdotally advocated to promote development of the horse's dorsal muscles or 'top line' by encouraging the horse to work in a more collected frame, increasing engagement of the abdominal musculature and the hind limbs. However evaluation of muscle activity within the horse's spinal muscle, longissimus dorsi, found the use of side reins did not increase muscle workload (Cottrill et al., 2009). Similarly to when using draw reins, handlers and riders should also consider the action of side reins and if there is the propensity within their design for the horse to be rewarded for offering the required response (e.g. removal of pressure) during their use.

Pessoa Training Aid

The Pessoa Training Aid has become a popular training aid used during lunging to promote muscle development and strengthen the back in young and sports horses in recent years (Figure 1). It consists of a series of ropes and pulleys affecting the horse's head and neck position and placed around the horse's hindquarters. The first section attaches to the bit and the second to a roller; the system can be set with the side ropes attached in three positions: low, to the roller through the horse's front legs (used for young / less established horses); middle, at shoulder height; and high, at approximately wither height (advanced horses) (Walker et al., 2013). Research has found that while the Pessoa does not increase longissimus dorsi activity (Cottrill et al., 2009) it generates kinematic changes which could improve the horse's posture and overall way of going. Walker et al. (2013) reported the use of the aid set to the middle level resulted in a significant reduction in speed and stride length in horses during working trot on a circle, with horses retaining a consistent stride duration suggesting the aid facilitated improved balance. Head and lumbosacral angle were also reduced at maximal hind limb retraction while simultaneously dorsoventral displacement of the middle of the back increased suggesting increased engagement of the horse's core abdominal muscles. While some beneficial outcomes are reported, further studies are required to fully understand the impact of the aid across different gaits and within all three positions to support its use in training and rehabilitation.

FIGURE ONE HERE

Figure 1: Horse working in a Pessoa Training Aid

Elastic resistance band

Training and rehabilitation techniques aimed at improving core muscle strength may result in increased dynamic stability of the equine vertebral column and would be a beneficial addition to an equine training programme (Pfau et al., 2017). A more recent addition to the training aids available is the elastic resistance band or Equiband™ system. This aid aims to improve dynamic stability and posture by providing proprioceptive stimulation to the horse's hindquarters to improve the horse's balance and posture by increasing abdominal muscle engagement through regular integration into a training regime. Studies have shown that the elastic resistance band acts to stabilise thoracolumbar kinematics in walk

and trot, as well inducing greater postural stability by reducing roll, pitch and mediolateral displacement in the cranial-mid thoracic region (Stenfeldt et al., 2016; Simons et al., 2015). Further work by Pfau et al. (2017) evaluated the impact of using the system within a four week training programme, also finding the elastic resistance bands reduced mediolateral and rotational movement of horses' thoracolumbar region, thereby increasing dynamic stability in trot. Therefore while more studies are needed to fully elucidate the impact of prolonged use of this aid, initial evidence suggests its use could be beneficial in equine training and rehabilitation regimes.

Table 2: An overview of equine training reins and lunging aids (adapted from Odenhaal, 2009a, b)

Training reins	<p>Running reins / draw reins: leather or webbing reins with a loop at the end, pass from the outside to the inside through the bit rings and are attached to the girth, either between the horse's front legs or along the sides below the saddle.</p> <p>Proposed action: to encourage the horse to lower his head, bringing it towards the vertical to promote development of the neck and back muscles</p>
	<p>The De Gogue: a strap from the girth runs between the horse's front legs and divides into two cord straps; these are passed through two rings or pulleys on a poll pad attached to the headpiece of the bridle and connected to the bit.</p> <p>Proposed action: to keep the horse's head and neck in the correct position and develop the neck and back muscles.</p>
	<p>Abbot Davies balancing rein: combination of pulleys and ropes; a broad strap is attached to the girth between the horse's front legs, two cord straps attach to this via pulleys which are usually connected to the bit, with clips at the end attached to rings on the reins.</p> <p>Proposed action: to develop the muscles in the back and hindquarter by encouraging the horse to raise his neck at its base</p>
	<p>The Harbridge: a strap is attached to the girth and passes through the front legs before dividing into two pieces of elastic which are clipped onto the bit rings. Used for flatwork only.</p>

	<p>Proposed action: to encourage a correct way of going by discouraging leaning, enhancing self-carriage and generally stimulating softness in the horse's back</p>
	<p>Elastic training rein or German rein or bungee rein: a durable and flexible elastic cord that is attached over the horse's poll and runs through the rings of the bit, and can be attached to the girth between the horse's front legs or along the sides.</p> <p>Proposed action: to promote self-carriage without putting pressure on the horse's mouth; can be used for both ridden and lunge work</p>
Lunging aids	<p>Side reins: two separate leather or webbing straps often with an elastic insert and a buckle at one end which is attached to the roller; a clip on the other end is attached to the bit or onto a cavesson lunging noseband</p> <p>Proposed action: encourage contact with the bit and correct way of going</p>
	<p>Chambon: a poll-pad fitted with rings or pulleys on either side, attached to the headpiece of the bridle; a further strap is then attached to the lunging roller, passing between the horse's front legs before dividing into two cords, which pass through the rings and clip on to the bit. The chambon should only be used for lunging.</p> <p>Proposed action: encourages the horse to lower the head and round the back</p>
	<p>Pessoa training system: a system of pulleys and cords which attach from a roller to the head via the bit and are combined with a strap passed around the hindquarters</p> <p>Proposed action: to increase collection, building hindquarter, back and neck muscle</p>
	<p>Equi-ami: a series of pulleys and ropes which creates a self-centring loop between horse's head and hindquarters, used for lunging.</p> <p>Proposed action: encourages the horse to bring its hind legs underneath its hindquarters, to lower its head and shorten its frame by developing wither lift</p>
	<p>German rope: a soft rope that is placed over the horse's shoulders and between the horse's front legs and is attached to the bit via pulleys; used within lunging</p> <p>Proposed action: designed to encourage the horse to lift and work over his back whilst on the lunge</p>

Conclusion

The use of training aids within equine training programmes is well established across professional, amateur and recreational riders, and horse owners. However the proposed function of many training aids to stimulate equine muscle development, gait characteristics, proprioception and the horse's biomechanics has not been investigated scientifically. While the evidence base to underpin the optimum use of equine training aids remains limited, the short and long term impact on equine performance will not be fully understood and therefore practitioners have to rely on their own, and peers' experience and judgement when selecting what device to use, how to use it and to judge if it is having a positive effect on their horse. Therefore a gap exists for academia and industry to work together for the benefit of the horse, and to engage in studies which investigate how training aids work to support horse owners and riders to make evidence informed decisions and promote an ethical and sustainable approach within equine training and management.

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