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The effect of blindfolding horses on heart rate and behaviour during handling and loading onto transport vehicles

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Abstract

Blindfolding is routinely used to aid the handling and loading of horses that are difficult to control. Fifteen relatively well-behaved horses of varying ages and disciplines were used to investigate the effects of blinkering and blindfolding on behaviour and heart rate in three situations: whilst stabled, when being led in a ménage, and during loading onto a lorry. Heart rate increased in all three situations when a blindfold was used, and when animals were handled by the least experienced of three handlers. The effects of blinkering on heart rate and behaviour were small compared with blindfolding. Overall, blindfolding appeared to make the horses more nervous and difficult to handle. However, the study does not discount the practical application that blindfolding may have for improving welfare and safety when handling certain individual horses. This work forms the basis for further studies involving animals less accustomed or disposed to being handled.

Keywords: *animal welfare, blindfold, blinker, handling, horse, loading, transport*

Introduction

Blindfolds are regularly used for loading racehorses that are difficult to control into stalls prior to racing, and are anecdotally reported to be of use in loading refractory individuals into vehicles for transport. The use of blindfolds varies among handlers (personal observation) and there is no specified protocol or legislation for their use. A number of national and international horse transport companies were contacted to assess the prevalence of blindfolding within the transport industry. Of the six who replied, one reported frequent use of blindfolds, two were vehemently opposed to it, while the remainder were familiar with the practice but used it only as a last resort.

The loading of animals onto transport vehicles involves the risk of physical injury and welfare being compromised (Broom *et al* 1996; Parrott *et al* 1998; Houpt & Lieb 2000), yet little work has been done to quantify the effects of loading procedures on equine welfare. Studies have shown that heart rate increases dramatically during the loading and unloading process (Waran & Cuddeford 1995; Waran *et al* 1996) and that positive reinforcement can be used to retrain 'problem' loaders and minimise behavioural resistance (Ferguson & Rosales-Ruiz 2001). However, no studies have directly compared the effects of different loading methods on the equine stress response. In contrast, significant work has been carried out into stress levels during transportation (Waran *et al* 1996; Friend *et al* 1998). Legislation regarding the transportation of horses is presented as codes of practice, with no reference to the specific methods used. Research into the use of blindfolds during loading may lead to improved safety and animal welfare during transportation.

Horses are transported for a number of reasons including for competitions (sport horses) and for slaughter. In general, sport horses are more valuable and receive a higher standard of care, but the performance (Marlin *et al* 2001) and welfare of both groups may be compromised by inconsiderate transport practices. Remarkably little is known about the implications of travel on competition. Welfare problems associated with slaughter horses are more serious. In countries that slaughter and process horsemeat on a large scale, particularly the USA and Eastern Europe, horse transport is subject to regulations designed to improve welfare. Within the UK, horse transport to slaughter is carried out in accordance with the Welfare of Animals Transport Order (WATO) 1997 (Anon 1997). Although these regulations focus on some areas of transport, including specifying the type of transport allowed, maximum journey times and the assessment of fitness to travel, there are a number of areas lacking specific legislation (Reece *et al* 2000). In particular, legislation regarding the loading process, including handling practices, are vague. For example, US law merely states that "any special needs or special handling requirements must be mentioned on the owner/shipper statement" (Reece *et al* 2000). A recent study of horses at slaughter found that 25% of carcasses were bruised, and that the risk of physical injury was significantly increased if horses were loaded and unloaded many times prior to slaughter (Grandin *et al* 1999). Therefore loading processes and practices require further study if the welfare of horses during transport is to improve.

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Table 1 The system used for behavioural scoring.

Behaviour score	Description of behaviour
1	Animal quiet, responsive and totally submissive to commands. Ear position forward with signs of total relaxation eg resting one hind limb, head drooping, complete absence of agitation or wariness.
2	Animal quiet and obedient, but slightly apprehensive and unwilling to totally relax. Ears may move backwards occasionally with weight shifting and increased movement of the head. Commands obeyed but accompanied by the above signs of agitation.
3	Animal increasingly restless, with irregular acknowledgement of the handlers' commands. Ears remain back, tail may be depressed, with frequent restless movement. Animal may defecate or vocalise.
4	Animal very restless, commands of handler are rarely obeyed. Ears remain back, tail depressed, may sporadically show periods of high activity. Defecation and vocalisation increasingly frequent.
5	Animal totally unresponsive to handler and highly agitated. Aggressive behaviours include rearing, kicking, biting, swinging of hindquarters, defecation and frequent vocalisation. Animal presents a danger to handler and self.

Blindfolds are regularly used in the racing and transportation of horses. There is little scientific evidence of their impact on welfare, and yet the benefits of further investigation are potentially great.

Materials and methods

Fifteen horses (nine mares and six geldings) were used in the study. Animal breed and type ranged from large Thoroughbred to small mixed-breed pony, representative of the range of horses commonly kept for recreational use in the UK. They ranged in age from 4 to 30 years and were kept in three small, well-maintained family yards equipped with a standard-sized training arena.

All horses were subjected to three different treatments: blinkered (using a pair of conventional adjustable blinkers), blindfolded, and a control treatment in which there was no visual restriction. The blindfold was constructed from a fly veil, designed to be worn over the head, lined with an opaque lining sewn to the material. Assessment of the menace response (Gelatt 1998, p 7 and p 442) was used to confirm no vision when the blindfold was worn.

A replicated 3 × 3 Greco-Latin square design was used to balance the order in which the treatments were applied, the day on which a treatment was applied, and the use of three different handlers. Only one treatment was applied to any horse on any one day. This whole design (five 3 × 3 Greco-Latin squares) was repeated in three different situations: whilst the horse was stabled, whilst being led in a ménage, and during loading onto a lorry. For the statistical analysis each situation was treated as a separate study.

Heart rate was measured using a Polartec Accurex™ (Polar Oy, Finland) recording system. The belt containing the heart rate monitor was placed on each horse where the girth would normally have been fitted. Heart rate, averaged over 5 s intervals, was recorded onto a laptop computer. Before and at the end of each treatment a saliva sample was collected using a cotton swab, for subsequent measurements of cortisol levels. However, as insufficient analysable samples were collected, no data are presented. Behaviour during each treatment was scored by the two handlers not involved in handling the horse, using a subjective scoring system. This system, designed by the authors specifically for this study, is described in Table 1. Half-integer scores were permitted.

The protocols employed in each of the three situations were as follows:

Study 1 — Stabled

The horse was led into the testing stall and a saliva sample taken. The heart rate monitor was attached and recording started. After 1 min of untroubled recording, the treatment (control, blinkers or blindfold) was imposed on the animal for a period of 10 min. When the period was complete, a second saliva swab was taken, the apparatus was removed, and the horse was returned to its own stall. All horses were familiar with the testing stall used. There were no other horses in the immediate vicinity of the stall, although familiar horses were visible in the surrounding fields.

Study 2 — Ménage

The horse was led to the ménage (a 20 × 40 m, fenced, open-air exercise area with a chopped tyre/sand mix floor) where a saliva sample was taken and the heart monitor attached. The horse was made to stand still for 1 min during which a constant, valid heart rate was obtained. Following this, the treatment was applied to the horse and the animal led in a 20 m right-handed circle for 10 min. The horse was then led back to the starting point where the equipment was removed and a second saliva sample taken. There were no other horses present in the ménage and it was out of sight of other horses.

Study 3 — Loading

The horse was led to a familiar designated preparation area, 5 m from the tail ramp of the lorry. A familiar, standard, three transverse stall, rear-loading lorry was used with no bedding on the ramp or in the stall, and with no other horses within sight. A saliva sample was taken and the heart rate

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Table 2 Behaviour scores and mean and maximum heart rate (HR) of horses in stable, ménage and loading situations and estimates of the significant effects ($P < 0.05$) attributable to blinkering, blindfolding and handling by Handler 3. All comparisons for which data are given were significant. The standard error of the estimated parameter is given in brackets (a confidence interval for each estimate is approximately ± 2 SE). Heart rates are beats per minute (bpm).

	Basal level	Blinker	Blindfold	Handler 3
Stable				
Mean HR	35.1 (1.96)	–	+ 6.8 (2.65)	–
Max HR	56.6 (4.17)	–	–	–
Behaviour	1.33 (0.159)	+ 0.38 (0.168)	+ 0.9 (0.168)	–
Ménage				
Mean HR	51.9 (2.37)	–	+ 17.6 (3.36)	+ 8.6 (3.27)
Max HR	88.6 (4.13)	–	+ 32.3 (6.32)	–
Behaviour	1.21 (0.128)	–	+ 0.86 (0.153)	–
Loading				
Mean HR	59.7 (4.32)	–	+ 6.3 (3.14)	–
Max HR	89.5 (5.92)	+ 9.2 (4.43)	+ 16.9 (4.53)	+ 11.9 (3.98)
Behaviour	1.5 (0.250)	–	+ 1.00 (0.230)	+ 0.60 (0.230)

monitor fitted followed by a 1 min wait to ensure a valid heart rate reading. The treatment was then applied and the horse led to the ramp for loading. Horses that loaded were tied in the lorry until 10 min had elapsed since the start of loading. A head collar was used and the head rein tied to a ring bolt within the stall. Problematic individuals were repeatedly led to the ramp in an effort to load them, up to a maximum of 10 min. A second saliva sample was then taken and the horse returned to its stable.

A conventional head collar was used to restrain the animals and they were handled with their rugs removed. During loading, the horses wore padded travel boots on all four limbs to prevent physical injury should they stumble.

Statistical analysis

Data from each of the three situations (stable, ménage and loading) were analysed separately using the software package MLwiN version 1.1 (Rasbash *et al* 2000). Multilevel models (Goldstein 2003) were used to model the repeated measures within horse and the fixed effects of treatment, day and handler. No interaction effects were modelled. The behaviour score was treated as a continuous variable. Increase in log likelihood was used to determine which parameters were retained in the models using a P value of 0.05.

Results

The treatment effects on heart rate and behaviour, which were retained in the multilevel models (ie the treatment effects that were significant), are given in Table 2, with the standard error of the estimate provided in brackets. The effects of blinkering, blindfolding and handler are given as offsets from the basal level. Where effects were present, all were increases from the basal level. For example, mean maximum heart rate whilst loading in visually unimpeded horses was 89.5 beats per minute (bpm). This was increased by a mean of 9.2 bpm if blinkers were used and 16.9 bpm if a horse was blindfolded. If Handler 3 was used there was a mean increase in maximum heart rate of 11.9 bpm, in addition to that attributable to blinkering or blindfolding.

Blindfolding generally led to a raised mean heart rate, a raised maximum heart rate and an increased behaviour score whilst stabled and in the ménage and during loading (Table 2). The increase in mean heart rate was approximately 6.5 bpm in the stable and during loading, and 17.5 bpm in the ménage. Maximum heart rate increased by 16.9 bpm during blindfolding and during loading. Blindfolding in the ménage produced an even greater increase in maximum heart rate: 32.3 bpm above that seen in the control treatment. The behaviour score was increased in all situations when horses were blindfolded.

Blinkering led to a measurable, but small, increase in maximum heart rate during loading and in behaviour score whilst stabled. Further increases in heart rate in the ménage, in maximum heart rate whilst loading and in behaviour score whilst loading were all associated with handling by Handler 3.

Discussion

Blindfolding has been demonstrated to have a 'calming' effect when used in the handling of certain species. Mitchell *et al* (2002) reported that the use of an opaque blindfold significantly reduced the heart rate of cattle and their 'objection' to restraint. When measuring the force exerted by cattle against a head plate while in a crush, together with heart rate, they found a significant reduction in force when the animals were blindfolded, suggesting that they were calmer. Similarly, 'hooding' broiler hens with completely opaque hoods notably reduced escape behaviours (Jones *et al* 1998).

However, in the present study with horses accustomed to handling, blindfolding consistently increased both heart rate

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and fractious behaviour in all three experimental situations: at rest in a stable, whilst being led in a ménage, and during loading onto a lorry. Additionally, several veterinarians and transport companies report that if the lights go out in an aircraft hold during a transport flight, horses become uneasy, with increased movement and vocalisation, and that these behaviours are reduced when the lights return. Although the results between situations in the present study are not strictly comparable, blindfolding in the ménage appeared to produce an increase in mean heart rate almost three times greater than that seen in the stable and during loading. This larger increase, if a reliable estimate, may have been due to the increased speed at which the horses were led in the ménage, or possibly due to the more open environment in which there were fewer acoustic spatial clues.

Variations in husbandry lead to different behavioural responses to the presence of humans in both farm animals and regularly handled horses (Grandin 2000). Different levels of early handling in foals are known to produce significant behavioural variation in later life (Waring 1983) and age has been found to affect behaviour during loading in horses (Waran & Cuddeford 1995). Although the findings from the present study show a general, marginal increase in difficult loading and handling and an increase in fractiousness with blindfolding, it cannot be discounted that blindfolding may still ease the loading of 'difficult' animals and increase the welfare and safety aspects of loading and transport for both horse and human. This should be the subject of further study as none of the horses in the present study refused to load.

A previous study found that the loading of horses onto a vehicle significantly increased heart rate (Waran & Cuddeford 1995). The authors postulated that the change in heart rate could have been induced by a 'motor change', attributable to the movement and exertions of the horse during the loading process, or to experienced horses associating the horsebox and loading procedure with competitions and thus becoming excited. In the present study, loading in the control treatment produced a mean heart rate that was only marginally above that produced in the ménage, and a maximum heart rate that was similar in both situations.

A number of studies have investigated the effect of the human handler on heart rate in horses. Lynch *et al* (1974) showed that a person entering or exiting a stable elicited an increase in horse heart rate. In contrast, stroking a horse, particularly at preferred allogrooming sites, produced a marked reduction in heart rate (Lynch *et al* 1974; Feh & de Mazieres 1993). Hama *et al* (1996) demonstrated that the extent of heart rate reduction depended on the general attitude of the human to companion animals. The heart rate of horses initially increased when stroked by male students with generally negative attitudes towards companion animals, but decreased immediately when stroked by students with more positive attitudes. In the current study, heart rate increased in relation to just one of the handlers (Handler 3). Interestingly, the horses were least familiar with this individual, who was also the least experienced, with only three years experience with horses compared with 20 years for both Handlers 1 and 2.

Blinkering appeared to affect horses in a similar but much milder way to blindfolding, with only two of the estimates significantly greater than the control treatment (Table 2).

Animal welfare implications

Blindfolding of horses which were accustomed to handling and generally amenable to being loaded resulted in an increased mean and maximum heart rate and made the animals marginally more difficult to handle. The use of one handler in particular resulted in an increased mean and maximum heart rate and an increase in fractious behaviour. This handler was also the most inexperienced of the handlers.

The results indicate that blindfolding did not subdue or calm the horses during handling as had been hypothesised by some authors. However, these results do not yet rule out the use of blindfolding as an aid to handling fractious animals, where a balance has to be made between the effects on the horse of blindfolding, its safety during an often-necessary procedure, and the safety of the handlers. The use of blindfolding for those horses not amenable or accustomed to handling and loading requires investigation.

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