Timeline of the Ridden Horse Pain Ethogram

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Part 2: Application of the Ridden Horse Pain Ethogram in the field

The series of seven developmental studies produced a Ridden Horse Pain Ethogram (RHpE) that provided a useful tool for determining the presence of musculoskeletal pain in ridden horses performing poorly. The next step was to determine if it could enhance diagnostic skills by actually using it in the field. A further five studies applied the RHpE in a wide range of both clinical and research settings, proving its usefulness in the advancement of equine welfare and performance.

Study 8

The first study to apply the ethogram in a clinical setting was designed to evaluate complex lameness (Dyson, 2018) . This retrospective study sought to unpick the clinical features of 25 horses that exhibited fore limb lameness but did not improve with anti-inflammatory drugs or diagnostic analgesia. Some of these horses had an odd, unexplained hopping-type lameness, but this was only observed when ridden (Fig. 1).



Fig. 1 A horse with episodic hopping-type forelimb lameness. When the horse was pain free, it worked happily with a normal facial expression and head and neck posture, as on the left. When displaying lameness, as on the right, the ears went back, the horse had an intense stare, head and neck posture changed and the bit was pulled more through to the right.

When this peculiar syndrome was described in a previously published paper, peer reviewers expressed scepticism about pain being the underlying cause of lameness. The ethogram was therefore applied to videos of a subset of 13 of the horses to document any potentially pain-related behaviour.

The results showed that:

- Pain behaviour scores were higher than those previously reported for nonlame horses.
- 92% had radiographic abnormalities of the caudal cervical and cranial thoracic vertebrae of potential clinical significance
- 76% became lamer after diagnostic analgesia
- 28% had differences in lameness when on a long rein compared with a contact
- 24% tilted the head and neck
- 16% stumbled in front
- Post-mortem examination of three horses provided the evidence of caudal cervical or cranial thoracic nerve root compression

It was concluded that there is increasing evidence that nerve root injury may cause forelimb lameness.

The application of the ridden horse ethogram and the pain behaviour scores clearly demonstrated that the horses in this study were experiencing pain.
This paper is free to access: https://doi.org/10.1111/eve.12980

Study 9

The objective of the next study (Thomson *et al.*, 2019) was to report the clinical findings of six horses referred for investigation of head shaking syndrome, known as trigeminal-mediated head shaking. This syndrome is characterised by spontaneous displays of uncontrollable, violent episodes of repetitive vertical, horizontal or rotary movements of the head and neck. Other clinical features may include muzzle rubbing, striking the muzzle with the forelimbs, snorting or behaving as if an insect was striking the muzzle. This condition can be highly distressing for both the rider and horse and it is estimated that up to 5% of the equine population may be affected.

During the clinical investigation, all six horses showed head tossing behaviour when ridden (Fig. 2) and two horses also tossed their heads on the lunge.



Fig. 2 (a-d) Head tossing behaviour reflecting underlying musculoskeletal pain. Note also exposure of the white of the eye and mouth opening and variable position of the ears relative to the head in (b). Removal of the pain causing lameness by nerve blocks abolished head tossing.

Tossing the head up and down is not diagnostic of trigeminal-mediated head shaking and may be indicative of musculoskeletal pain. Abnormal head movements may easily be mistaken as signs of trigeminal-mediated headshaking by horse-owners, with failure to recognise associated lameness.

All the horses in the study had various sources of musculoskeletal pain. Five of the six horses had abolition of head tossing behaviour after diagnostic analgesia resolved musculoskeletal pain and the remaining horse had significant improvement in this behaviour. The Ridden Horse Pain Ethogram was employed in the assessment of all the horses before and after nerve blocking and clearly demonstrated that head tossing behaviour is an important sign of musculoskeletal pain, which should be differentiated from head shaking syndrome caused by facial nerve pain.
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Study 10

As the human population gets heavier there has been growing debate about relative rider to horse sizes. This topic was first discussed at the Saddle Research Trust International Research Workshop in 2012 and then highlighted as a research priority at the 2nd SRT meeting in 2014. The next project was funded by World Horse Welfare and the Saddle Research Trust, in addition to several other industry organisations.

The objective of this randomised trial (Dyson *et al.*, 2019) was to assess gait (using Inertial Measurement Units) and behavioural responses (using the Ridden Horse Pain Ethogram) of six sound horses to four experienced riders who were of similar ability, but different bodyweights. The rider bodyweights were: Light (L) 61 kgs, Moderate (M) 78kgs, Heavy (H) 91 kgs, Very Heavy (VH) 141 kgs. Including tack, the range of the rider horse bodyweight percentages for the L, M, H & VH riders, respectively were 10.0–11.7%, 12.8-15.0%, 15.3-17.9%, 23.6-27.5%. In random daily order over a 4-day period, each horse and rider combination started a 30-minute ridden test. All 7 VH and 5 H tests were abandoned due to temporary lameness. One H test was stopped due to the display of 10/24behaviours from the ethogram.

Retrospective review of video recordings of the tests revealed that there was a positive correlation between rider weight and the number of behaviours of the RHpE displayed (Fig. 3), although for the majority of the tests the total behaviour score was less than eight.



Fig. 3 Rider H, because of his long leg length and the size of the saddle, is forced to sit on the back of the saddle. This inappropriate weight distribution creates discomfort reflected by the horse's behaviour: swishing the tail, ears back, intense stare, front of the head > 30^0 in front of the vertical.

The study documented a substantial temporary adverse effect of rider on gait and behaviour. The clear take home message was that large riders can induce temporary lameness and behaviours consistent with musculoskeletal pain. This may relate to rider bodyweight and/or weight distribution. The results clearly demonstrated deleterious effects of inappropriate rider size and also suggest that any adverse influence of ill-fitting tack for horse or rider may be accentuated by riders who are heavier and/or taller. These results do not mean that heavy or tall riders should not ride, but suggest that, if they do, they should ride a horse of appropriate size and fitness, with a saddle that is correctly fitted for both horse and rider.

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Study 11

The objective of this study (Dyson, 2019) was to apply the RHpE to event horses warming up for the dressage phase of a CCI 4-star (now 5-star) three-day event and compare their behaviour scores with their cross-country performance.

In the dressage warm-up:

- 27 non-lame horses scored 0–4/24 behaviours. The most frequently observed behaviours were the head being behind the vertical for more than 10 seconds and the mouth held open with separation of the teeth for more than10 seconds.
- 8 horses with gait abnormalities scored 3–9/24 (Fig. 4).



Fig. 4 Warming up for dressage at a four star (now five star) three-day event. The horse is above the bit with the mouth open and separation of the teeth, the ears are back, there is an intense stare, the head is tilted.

34 horses started cross-country:
- Of 28 horses which scored <7, 8 (28.6%) were eliminated or retired.
- Of six horses which scored ≥7, 4 (66.7%) were eliminated or retired.
The proportion of horses failing to complete was significantly higher for scores ≥7
- One horse with a stiff, stilted gait scored 9, but completed.

All horses that started the competition passed a veterinary inspection but many of them nonetheless showed gait abnormalities when ridden, which were highlighted by behavioural changes. The results from this study cannot prove a causal relationship between gait abnormalities and failure to complete, however it seems likely that discomfort may compromise cross-country performance in some horses. The key message is that horse performance may be substantially improved by identifying these gait abnormalities, reaching an accurate diagnosis and successfully treating the horse.

Study 12

The aim of this study (Dyson and Pollard, 2020) was to apply the RHpE to 60 horses in regular work, ridden by their usual riders and assumed by their owners to be working comfortably. In addition to the application of the ethogram, the presence of increased back muscle tension or pain, poor saddle fit, gait abnormalities and rider skill were assessed by independent experts.

The results showed that a disturbingly high proportion (73%) of the horses were lame and had significantly higher ethogram scores than non-lame horses. An interesting feature was that 47% of the horses had gait abnormalities in canter, highlighting the importance of evaluating the quality of canter, which may be compromised by hindlimb lameness or sacroiliac joint region pain.



Fig. 5 Gait abnormality in canter: Croup high, the head is slightly tilted, the right ear is back and there is an intense stare

It was clear that riders, irrespective of their skill level and experience, had a lack of recognition of the behavioural signs which may reflect musculoskeletal pain. Many riders learn to ride on horses which exhibit these signs, so there is a generalised acceptance that these behaviours are normal for horses. The ethogram provides a simple method of determining the likely presence of musculoskeletal pain, with the current study providing further evidence of the strong association between an ethogram score of 8 or more and the presence of lameness.

The take-home message from this important work is that education about what constitutes abnormal behaviours is needed, so that lame horses are recognised and

undergo appropriate investigation and treatment, in order to both enhance equine welfare and improve performance.

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Conclusions

This series of five studies has clearly demonstrated that the Ridden Horse Pain Ethogram is an invaluable tool that can be easily applied in a wide range of settings in the field. This seminal work has highlighted the urgent need for education of all stakeholders in the equine sector including veterinarians, coaches, saddle fitters and other professional practitioners, riders and horse owners. The RHpE is a game-changer, but how quickly we can make a positive, permanent impact on the welfare and performance of every ridden horse depends on every one of us doing our best to educate those around us.

Further work is ongoing and will be reported on as results are published. Studies of gait abnormalities, rider skill, behaviour during tacking-up and elite event horse performance are all producing fascinating results and vital new information, which will be shared in the next chapters.

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EDUCATIONAL COURSE

In a collaboration with Equitopia, Sue Dyson has created a 12 part, interactive online course on how to apply the Ridden Horse Pain Ethogram.

Equitopia is a resource for online and in-person educational content on the care, welfare and training of horses, bringing highly qualified professionals in the equine industry to your phone and computer through online courses, webinars, blogs and podcasts.

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