

# New Horse Monitoring Technology Reveals Unique Insights into the Behaviour of Horses at Pasture

The lives of domesticated horses vastly contrast with those of their feral ancestors. Factors arising from human convenience such as living in confined spaces, housing with fewer companions and reduced access to turnout and forage have resulted in sub-optimal conditions for most modern equines. Combined with energy-rich feed rations surplus to requirement and reduced movement and exercise, these lifestyle changes have led to the development of many health problems. Consequently, horse owners and carers carry a huge responsibility in providing and maintaining an adequate level of care in which the horse is in the best health, physically and psychologically, to fulfil its role. How best to achieve this balance is a continual investigation and something the equine industry is heavily dependent on equine science and research to uncover.

Principally, turnout, or lack of it, poses one of the biggest challenges to the domestic horse. Limited freedom and the ability to roam continually over large distances alter several innate behaviours and have been associated with the development of stereotypies, weight gain, reduced mobility and aggression. Other than quantifying the distances travelled of confined and unconfined horses, which was most recently documented by Hampson (2010), research using GPS trackers to investigate altered behaviours further is surprisingly limited. Elsewhere in animals, dataloggers using GPS are increasingly popular to track the behaviour habits and movement of wildlife and agriculture (Tittler *et al.*, 2015; Jónsson *et al.*, 2011). For instance, to correlate oestrus and movement of cows (Shahriar *et al.*, 2016) and monitor the distribution of species within a habitat (Hepplewhite, 2010). As GPS tracking in horses in captivity could yield fruitful insights on the difference of pasture size, pasture type, social interactions as a herd, changes throughout the seasons and the overall health of the horse, further exploration could be beneficial to improve management practices and equine welfare.

In continuation from Hampson's (2010) earlier work to depict average distances travelled by wild and domestic horses, a similar study was conducted at University Centre Hartpury earlier this year. The study was carried out using Trackener's raw data to investigate whether activity level at pasture was affected by the duration of turnout, the size of pasture and the time of year, i.e. the season. During part of Trackener's development, devices were placed on numerous horses of different breed, age, height, sex and domestic use to collect over 5000 hours of data. The data from five of these horses, all leisure horses and 16 to 16.2hh, with varying turnout lengths was used for this study. Using this data, a student project analysed the distances travelled and the speed of horses out at pasture using the GPS coordinates produced by the device. These GPS coordinates were visualised on a heat map as shown in Figure 1, showing pasture size. An example of the data from one horse is also shown in Figure 2.

Pasture sizes ranged from 0.35–1.97 ha while turnout hours ranged from 06:29:45–37:04:26 (hours, minutes,



Figure 1



Figure 2

seconds). The analysis revealed that the size of field did not influence the distance (as shown in Figure 3) or speed travelled during grazing periods ( $p=0.643$ ). Furthermore, there was no significant difference between the time of year and duration of turnout ( $p=0.195$ ). However, the distance travelled ( $p=0.003$ ) and average speed ( $p=0.028$ ) did show significant seasonal variation with greater distance and speed recorded in autumn than summer. These distances averaged at 7.4km/day in autumn and 3.7km/day in the summer.

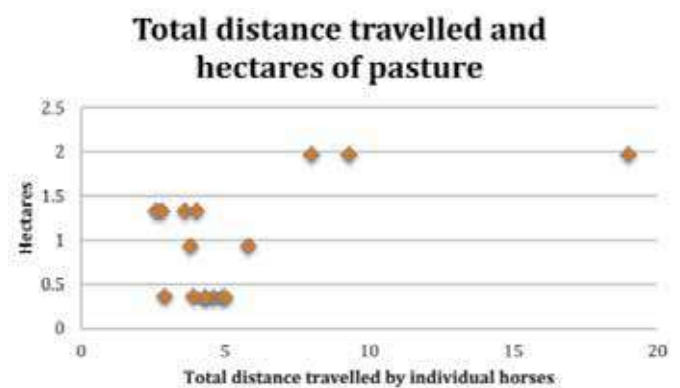


Figure 3

As research on turnout can reveal behaviour patterns related to the horse's time budget and reflect aspects of the horse's health and mobility, social interactions, foraging behaviour and contentment in their environment (Yarnell *et al.*,

2015), it is useful to compare domestic horse behaviour to those in a natural state as an indicator of welfare (Veasey *et al.*, 1996). This research investigating the size of turnout has shown little to no effect on the tracked behaviour of horses and the potential impact on welfare. However, the distances covered by horses even at their highest level of activity (autumn –7.4km/day) are well below those of wild horses, travelling up to 28.3km/day (Hampson *et al.*, 2010). The effects of reduced movement in humans have been well documented, with implications on weight, joints, physiology and even mental health. Although not as well researched in horses, we know that mobility can be a good indicator of the horse's health and comfort in cases of arthritis, laminitis and lameness and therefore, sudden changes in activity could suggest early signs of a health problem. This would enable horse owners/carers and vets to treat conditions earlier on, thus preventing unnecessary suffering and the development of more serious conditions. This is something Trackener are keen to explore further with data-driven research.

Trackener is a new 24/7 equine monitoring technology consisting of an electronic device worn by the horse in a bib or on a girth strap and a user-friendly mobile and desktop app. Thanks to Trackener technology, users receive unique insights about their horse's activity, behaviour, sleep, anxiety, heart rate, exercise sessions and exercise recovery with alerts to critical problems such as colic. Currently, the new datalogging equipment is being used in research across many different UK universities and for practice within some of the top equine veterinary hospitals.

Although this study was just a sample pilot with data on horses that were not hand selected by the researcher, the study produced some interesting and promising results for the future. Trackener has already been utilised for a second study elsewhere investigating a similar topic – the movement and cumulative exercise of liveried horses during winter and summer to investigate how much activity the horses are actually getting to see whether energy exerted correlates with nutritional intake throughout the year. With summer data currently being recorded, results should appear in the autumn. The potential for more data collected on a larger sample size is exciting, especially as there is ever-growing speculation on domestic management practices which may be impinging on welfare.

Trackener is ideal for collecting data on horses over long periods of time and can be worn around the clock during turnout, transport, stabling and exercise sessions. For each horse listed, the app holds information about the horse's height, weight, breed, age and activity. This type of aggregated data has potential value for a number of uses from individual owners able to compare their own horse to others, to researchers, insurance companies and pharmaceutical companies to calculate an accurate incidence rate of health problems in specific cohorts of horses and better understand the risk profiles of the horses based on their lifestyle and training regime.

Initially developed to detect critical health problems, studies on the detection accuracy of colic are currently underway at the University of Liverpool to help refine Trackener's algorithms further. The device has consistently been developed scientifically with both equine and technology experts to provide accurate and valuable insights to health professionals. Having worked with vets from the start and compared CCTV and device readings repeatedly through product development, the device has been thoroughly validated against other methods. Although colic is the main health issue Trackener aims to detect



and prevent, the use of the kits for preventative health is vast.

It has been documented that stress and anxiety are experienced by some horses due to separation from the herd, long hours spent housed individually and unfulfilled behavioural desires. Consequently, as stress is a pre-cursor of EGUS, it is believed that Trackener kits could highlight and predict horses prone to the condition based on what the owner is not always able to see – pacing the fence in the field, box walking at night etc. By learning more about the horse's behaviour at rest, not only does this benefit leisure and professional horse owners, helping them achieve optimal health and condition, but can also improve the vet and health professionals' understanding of the state and health condition of the patient before examination, giving them greater visibility and scientific data to accompany the owner's comments.

Although Trackener's objective is to improve the health and welfare of domesticated horses through direct use, we are also hoping that it can help advance equine science research thanks to easily accessible data recording and analysis. If you're interested in discussing it further with us, please don't hesitate to contact us.

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