



The appliance of science

Discover fascinating research projects that have taken place around the world to get a better understanding of equine behaviour

The world's leading equine scientists gathered in Vancouver, Canada, last month to share and discuss the findings of their latest research.

They were attending the annual conference of the International Society of Equitation Science (ISES).

ISES is an organisation that promotes scientific research to raise welfare and safety standards in the equestrian industry and improve the horse-human relationship.

The event, held at the University of British Columbia, offered a packed schedule and presentations were made on a wide variety of topics.

Here, equine behaviourist and regular *Horse* magazine writer, Justine Harrison, reports back on some of the topics that were up for discussion...



The ISES conference aims to improve equine welfare

What the eyes can tell us

Horses communicate primarily using body language and they display a number of facial expressions.

Their eyes, in particular, can be very expressive and are thought to reveal how a horse is feeling.

Many equine behaviourists and horse owners believe the wrinkles above a horse's eye may be associated with discomfort or anxiety – they are often called 'worry lines'.

However, until now there has never been any scientific study researching the links between these facial expressions and the horse's emotional state.

Sara Hintze and a team of researchers from Switzerland, the UK and the USA set out to examine whether eye wrinkles are caused by negative emotional states in the horse, or whether it was simply a case of humans interpreting these wrinkles as they would for themselves.

The wrinkles studied appear above the upper eyelid and are a result of the contraction of the underlying inner eyebrow raiser muscles. These eye wrinkles are commonly seen, but may differ in shape, number and severity in different individuals.

The team placed 16 horses at the Swiss National Stud Farm into two 'positive' situations:-



Negative situations increase eye wrinkles...



...while stroking was found to reduce them

- Anticipation of a food reward;
- Being stroked.

The horses in the study were also put into two 'negative' situations:-

- Competing for food;
- Having a plastic bag waved nearby.

These four test conditions were chosen as they were situations the horses were

reasonably likely to encounter in their day-to-day management.

The eyes have it

Photos of the horses' eyes were taken while they were tested and the images analysed based on overall impression, shape of the eyelid, eye whites, number of wrinkles, markedness and angle.

In the situations presumed to be positive, the researchers found that while stroking did reduce the expression of eye wrinkles, wrinkles were sometimes seen when food was present. This may have been as a result of the horses being frustrated around food.

The negative situations did increase the likelihood of the eye wrinkles occurring.

The researchers found the angle of the wrinkles changed, depending on the situation. The angle was wider in negative situations, compared to positive, due to a stronger contraction of the inner eyebrow raiser. More eye white was seen in negative situations.

● **Research team:** Sara Hintze (University of Bern and Agroscope, Swiss National Stud Farm, Switzerland); Samantha Smith (University of Edinburgh, United Kingdom); Antonia Patt (University of Maryland, United States); Iris Bachmann (Agroscope, Switzerland); Hanno Würbel (University of Bern, Switzerland).

Get fit for riding

Riding is a unique sport, which involves two interdependent athletes competing together as a partnership. In order to perform at their best, both need to be physically fit.

Pain and tension in the back of the ridden horse is a common occurrence and can be a cause of poor performance and lameness.

The rider is increasingly being recognised as a contributing factor to both equine back pain and lameness, and previous studies have found that an asymmetrical riding position can be damaging to the horse.

Unfortunately, many riders do not apply the same principles of athletic training to themselves as they do to their horses.

Equine scientists Alexandra Hampson and Hayley Randle set out to investigate how an eight-week, unmounted core fitness programme would affect the symmetry of the riding position, the overall force exerted on the horse's back and the horse's stride length.

Ten horse and rider combinations, competing at Medium-level dressage, took part in the study.

They were fitted with an electronic saddlepad to measure seat pressure, and markers were put on horse and rider to assess their movement.

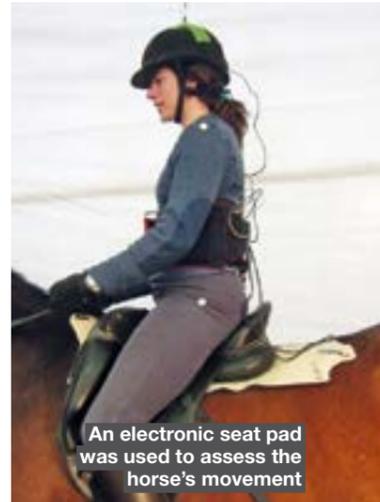
After a 20-minute warm-up, they performed sitting trot down a 16m 'runway'.

The riders were filmed using high-speed video and the results analysed using biomechanics software.

Participants then followed a core fitness programme, three times a week. The 22-minute programme was developed for riders by a kinesiologist and an equine scientist and consisted of a brief warm-up, core strengthening, hip stability exercises and key stretches.



Riders performed ridden tests to gauge their symmetry



An electronic seat pad was used to assess the horse's movement

Noticeable improvement

At the end of the eight-week trial, the participants completed the ridden test again and the results were analysed and compared.

In the initial ridden test, all of the riders had an asymmetrical position with significant differences in pressure on the left and right

side of the saddle. However, after the eight-week fitness programme, the riders showed a marked improvement in their symmetry. In addition, the horses average stride length increased by 8.4 per cent.

The riders and coaches involved reported a noticeable improvement in the performance of both riders and horses.

Some of them commented that the riders sat deeper in the seat, had increased stability in the saddle and that the horses showed an increase in straightness.

The researchers concluded a core fitness programme can have a significant effect on rider symmetry and may provide an important method to improve equine welfare and performance.

"There is great potential for all types of riders to become more effective and harmonious with their horses, through using a low-cost core fitness regime designed for equestrians," said research team member Hayley Randle.

● **Research team:** Alexandra Hampson (University of Edinburgh), Hayley Randle, (Duchy College).

The happy athlete

Research looking at positive emotions in humans has revealed there are differing views on what makes us happy. But it is generally agreed having good relationships, experiencing pleasurable activities and feeling engaged in life can make us happy.

Happiness is seen as a positive state of mental wellbeing and having a good life.

Most horse owners believe that when their horses are playing or relaxing with their herd mates, they are happy.

Research into the behaviour of other domestic species has shown that levels of play, affiliative behaviours (such as mutual grooming) or even changes in facial expression are good indicators of a positive emotional state.

Ever since the FEI described the ideal dressage horse as a 'happy athlete' there has been discussion about what that actually means and how we can recognise happiness in horses.

To date, there has been little research into the positive emotional states in horses. So how do we recognise a 'happy athlete' if we don't know what we are looking for?

At the conference Professor Natalie Waran reviewed research into equine happiness, describing a study on 'positive emotion' and 'facial expression' in horses.



Consider what signs your horse shows in different situations

The research team studied 20 horses to find out how they felt about various stimuli. The horses were tested to see which of four different treatments they preferred:-

- Being near a human;
- Being groomed;
- Being sprayed with an aerosol;
- Being alone.

The strength of their reaction was used to decide which stimuli they found pleasurable and which they found aversive.

Each horse's preferred and aversive treatment was then applied in a consistent way and their facial expression, heart rate, eye temperature and general behaviour were measured.

Personal preferences

The researchers found more than half of the horses tested had a consistent preference for a stimulus.

However their preferences differed, with the majority preferring to have a person standing nearby, rather than receiving wither grooming or being left alone.

The more obvious behavioural signs were shown when the horses were in the presence of their least preferred stimulus.

For example, the horses displayed more fore- and hindleg lifts, kicks, widening of the eye, a tight mouth and tail swishing.

There were also increases in the number of times the white of the eye was seen, the time

spent with ears back or nostrils flared and a high neck position.

When the horses were in the presence of a preferred stimulus, the researchers saw the horses display behaviours such as lifting their tails, a drooping lower lip, narrowed nostrils, investigation using the muzzle, an angled eyebrow and a lowered neck position.

The team suggests further research could have practical implications for horse welfare and human safety.

Professor Waran asked the audience to consider researching the positive aspects of horse behaviour "so we can train coaches, riders and judges to recognise and reward behaviour indicative of positive emotion".

"Unless we develop and use good evidence based measures/indicators, and emphasise their relevance to horse and rider – we will always be at risk of interpreting horse behaviour in relation to our own needs and emotional experience," she said.

"Happiness is not just the absence of negative emotions – animals also need positive experiences..."

● **Presenter:** Professor Natalie Waran (University of Edinburgh).

● **Research team:** Rachael Stratton, Naomi Cogger, Ngaio Beausoleil, Kevin Stafford (Massey University, New Zealand), Natalie Waran (University of Edinburgh), Mairi Stewart (AgResearch, New Zealand).

Does sleep affect a horse's performance?



Lying down produces a better quality sleep

How a horse performs in a competition is usually attributed to his physical fitness, ability and training, or perhaps the rider's performance on the day. Less focus is on other areas of the horse's management.

Research into human sleep patterns has shown that not getting a good night's sleep can affect memory, performance and cognition. So researchers at Hartpury College, Glos, investigated if sleep patterns can influence a horse's performance.

For two consecutive nights, seven horses that compete in affiliated showjumping were filmed using an infrared video.

The frequency and duration of the time spent asleep when standing, resting on their sternum (sternal recumbency) and lying on their side (lateral recumbency) were recorded and their sleep patterns analysed.

On the third day, the horses completed two rounds of a seven-fence showjumping course of 0.76 metres.

Their performance was then measured by calculating a score based on the number of faults acquired and the time taken to complete the course.

The researchers then looked for any correlation between the type, duration and frequency of nocturnal sleep behaviours and the competition score.

Identifying a sleep pattern

While there were differences between individual horses, the researchers found there were associations with some sleep behaviours and performance.

The horses that did better in the 'competition' generally had more total sleep, on average, than those at the bottom of the leaderboard.

Those in the top three positions had slept lying down (in either sternal or lateral recumbency) for significantly longer than the bottom three horses.

The results indicate the sleep patterns of horses may have an effect on their performance, just as in humans – however, further research is needed.

The researchers hope their study will raise awareness of how important it is to consider the quality of a horse's sleep in their management.

● **Research team:** Sophie Colley, Darcy Murphy, Lucy Dumbell, Linda Greening (Hartpury College, UK). ■



Standing up to sleep may affect performance