



**12th Alltech-Hartpury Student
Conference**

Conference Proceedings

10th May 2023



**HARTPURY
UNIVERSITY**

Hello & welcome.....

Alltech® is one of the top ten global animal health companies dedicated to providing natural solutions to today's animal nutrition challenges. It is a leader in innovation and education and is proud to be associated with Hartpury University for the jointly run, annual student conference. The Alltech-Hartpury Conference is aimed at students and scientists who are interested in the application of emerging research. Traditionally, conferences can be a daunting place for students to present research work. As such, this conference gives both undergraduate and postgraduate students the chance to experience a scientific conference, from the process of abstract submission and review, to delivering a theatre presentation or producing a conference poster. In collaboration with Hartpury University, Alltech® offers the opportunity to, not only promote equine research, but to bring the next generation of researchers in to contact with today's experts.



H. Warren

Dr Helen Warren; European Technical Manager, Alltech

On behalf of Hartpury University and the Alltech-Hartpury Conference Committee, it is our pleasure to welcome you to the 12th Alltech-Hartpury Conference, held within the grounds of our beautiful campus here at Hartpury. Staff in Hartpury University's Equine Science Department are passionate about our subject and one of our wider aims is to maximise opportunities for dissemination of research across the breadth of the equine industry. Our collaboration with Alltech® has provided a unique opportunity for like-minded academics, industry professionals and students to debate emerging ideas which could have a positive impact on performance, health and welfare of the horse, and the development of the equine industry. We are delighted with the breadth of topics and the standard of the research in today's programme and looking forward to what is predicted to be an enjoyable and inspiring conference day; we hope you enjoy it as much as we do.



K Leśniak

Dr Kirsty Leśniak; Conference Organiser, Senior Lecturer in Equine Science, Hartpury University

Acknowledgements

The Alltech-Hartpury Conference Committee gratefully acknowledges the support of all collaborative partners who have made this conference possible. We are very much indebted to the peer review team of Dr Helen Warren, Ella Bartlett, Lauren Birkbeck, Dr Carrie Ijichi, Dr Rebecca Blanchard, Dr Georgina Crossman, Dr Jane Williams, Lorna Cameron, Dr Simon Daniels and Natalie Stones who have given their time freely to offer support and guidance to those presenting today.

Thanks also to the staff members of Hartpury University who have helped setup in preparation for the conference. Gratitude is also extended to Professor Jo-Anne Murray, Professor Sara Jane Hobbs and Roly Owers for delivering the keynote presentations.

Prizes

Prizes will be awarded to both undergraduate and postgraduate students for the best theatre and poster presentations.

Prizes have kindly been sponsored by Alltech®.

Alltech-Hartpury Conference Committee members 2023

Dr Kirsty Lesniak (Conference Committee lead)

Dr Helen Warren (Alltech® sponsor lead)

Emma Davies

Lorna Cameron

Victoria Walker

Laura-Jane Roberts

Aisling Carrol

Rebecca Coleman

Sophie Armstrong

Scientific Programme Wednesday 10th May

Morning Session:

8.15am Onsite registration

(at 9.00am please make your way down to the Conference Hall ready for a 9.10am start)

9.10am Dr Helen Warren and Dr Kirsty Leśniak: Welcome to the Conference

9.15am: Professor Jo-Anne Murray – University of Glasgow; The effect of diet on the equine microbiome?

10.00am Undergraduate Student Oral Presentations

10.00am: Albane Montgomery – Royal Agricultural University: Behavioural traits are associated with stereotypic behaviour in horses

10.15am: Isabel Zealley – Oxford Brooks University: Do equids have the cognitive ability for mirror self-recognition? Understanding the role of mirror in the industry to aid equine welfare.

10.30am: Beata Kaminska - Hartpury University: Investigation of mental toughness in equestrian sports.

10.45am Poster session with refreshments at Hartpury House

11.30am Undergraduate Student Oral Presentations

11.30am: Alice Wright – University Centre Sparsholt: Exploring the relationship between equine qualifications and equine quality of life

11.45am: Maria Donovan – Hartpury University: A qualitative interview study to explore factors influencing horse owners and managers practices relating to equine internal parasite management

12.00pm: Sarah McLean & Savannah Jackson – Oxford Brooks University: Exploration of an equine behavioural 'toolkit' to provide information for discussion within the creation of a social licence to operate.

12.15pm: Professor Sarah Jane Hobbs – University of Central Lancashire: Evaluating the impact of impairment on performance for Para Dressage

1.00pm - Lunch Break – Hot and cold food is available to purchase at our Graze restaurant

Afternoon Session:

2.00pm Undergraduate Student Oral Presentations

2.00pm: William Eagles – University Centre Sparsholt: An investigation into the relationship between hay soaking time and properties of effluent water

2.15pm: Ciara Powell – Hartpury University: Functional Asymmetry in Performance Horses: Wither and Pelvic movement In-Hand and in a Free and Working Posture Ridden at trot.

2.30pm Postgraduate Student Oral Presentations

2.30pm: Megan Long – Hartpury University: A pilot study investigating under-rug temperature and the nocturnal behavioural profile of the stabled horse

2.45pm: Anna Srutova – Writtle University College: The immediate effect of poles and kinesio tape on engagement of rectus abdominis and longissimus dorsi, pelvic symmetry and kinematics.

3.00pm Poster session with refreshments at Hartpury House

3.30pm Postgraduate Student Oral Presentations

3.30pm: Leah Crook – Myerscough College: The Influence of Pre-ride Warm-up and Rider Coaching on Horse Rider Position and Horse-Rider Synergy

3.45pm: Jessica Johnson – Nottingham Trent University: What are you watching? Rider and non-rider gaze behaviour while watching cross-country eventing video footage.

4.00pm Roly Owers - CEO of World Horse Welfare: Social licence and its relevance to the future of equestrianism.

4.45pm Presentation of prizes

5.00pm Conference closes

Professor Jo-Anne Murray

University of Glasgow



Professor Jo-Anne Murray has over been involved with horses since a young girl and has extensive academic and practical experience. She has a PhD in Equine Nutrition, a Postgraduate Diploma in Animal Nutrition, a Degree in Equine Science. She is a registered Animal Nutritionist with the British Nutrition Society (RNutr) and is the first Animal Nutritionist to be awarded a Fellow of the Association for Nutrition (FAFN). Jo-Anne is also a Fellow of the Royal Society of Biology and a Principal Fellow of the Higher Education Academy (PFHEA). Jo-Anne is also a British Horse Society Intermediate Instructor (BHSII) with experience of managing horses across a range of disciplines.

Jo-Anne set up the first online MSc in Equine Science at the University of Edinburgh and the first online MSc in Animal Nutrition at the University of Glasgow. She also ran the acclaimed massive open online course in equine nutrition. Jo-Anne's research has been aimed at improving gut health in equids, including investigating the effect of diet on the large intestinal environment of the horse and also on behaviour. Jo-Anne has published extensively on equine nutrition and is frequently invited to speak at major equine conferences around the globe. Her combined academic and practical experience has led to her excellent reputation in providing practical, up to date, advice on equine nutrition for all classes of horses and ponies.

Professor Sarah Jane Hobbs

University of Central Lancashire



Dr Sarah Jane Hobbs is a Professor of Equine and Human Locomotion at the University of Central Lancashire, where she also gained a BEng(Hons) Mechanical Engineering degree in 2000 and a PhD in equine biomechanics in 2007. Her PhD work involved developing instrumentation to measure internal hoof strain and using 3D motion capture techniques to track motion of the horse's forelimb. Since then, she has collaborated on international studies, which include investigating fundamental aspects of balance and stability, exploring the functional consequences of uneven fore hooves, defining performance in dressage and exploring methods of analysing continuous gait data. She is the Director of the Research Centre for Applied Sport, Physical Activity and Performance at the university, leading author on the FEI Equine Surfaces White Paper, currently leading a project to evidence the FEI para-dressage classification system and co-leading a project to quantify turf going for racing and eventing cross country. Her interests span the kinetics and kinematics of equine gait, hoof-horse-surface interactions, muscle activity during movement, horse/rider interactions and hoof structure, growth and mechanics.

Roly Owers MA MSc VetMB MRCVS

CEO of World Horse Welfare



Roly is a qualified veterinary surgeon and has been Chief Executive of the charity World Horse Welfare since 2008. He graduated from Cambridge University in 1992 and acquired his Masters degree in Nutrition from the London School of Hygiene and Tropical Medicine in 1997. His previous veterinary roles included the Blue Cross and Royal Army Veterinary Corps.

Roly plays an active role in much of World Horse Welfare's work supporting the horse-human partnership, and as a Director of the British Horse Council he regularly liaises on policy with Defra, the devolved administrations and Ministers. He also advises the International Equestrian Federation (FEI), the International Horse Sports Confederation (IHSC) and the British Horseracing Authority (BHA) on horse Welfare.

Roly is currently Treasurer of the British Equine Veterinary Association (BEVA), Chairman of the UK Equine Disease Coalition, a Director of the British Horse Council, a Board member of the European Horse Network, Chair of the International Coalition for Animal Welfare and Treasurer of the World Federation for Animals.

Postgraduate Oral Presentations

Temperament characteristics are associated with stereotypic behaviour in horses

Montgomery, A.F.V., Hemmings, A. & Moore-Colyer, M.*

School of Equine Science, Royal Agricultural University, Cirencester UK

WINNER of the prize for
the best undergraduate
oral presentation

Keywords: Equine, Stereotypies, Behaviour, Management

Introduction: Stereotypic behaviour can be harmful in horses and its causes are not fully understood. Equine temperament characteristics may potentially influence stereotypies risk. To assess this, it is important to determine if behavioural traits represent reliable characteristics that are stable over time. Management style has been associated with stereotypies. It is uncertain if there is an association between temperament and stereotypies and whether this may be the result of management. The objective of this study was to examine inter-rater agreement when assigning equine behavioural traits and to assess if these traits are stable over time. The association between behavioural traits and stereotypies was assessed, and if this association was independent of management characteristics.

Material & Methods: A total of 20 horses at a riding school in Sweden were each assessed by three people working in the riding-school using online self-completion questionnaires. They were asked to provide ratings for 41 temperament characteristics on a scale of 1-9 in November 2022 and then again in March 2023. Inter-rater agreement and agreement overtime were assessed by identifying the proportion with fewer than 2 standard deviations between the measures. A separate study in England collected information on the same 41 temperament characteristics among 99 horses using self-completion questionnaires. Other measures included identification of stereotypies and management characteristics. Factor analysis was used to condense the 41 temperament characteristics into a smaller number of factors. Logistic regression was used to identify associations between the temperament factors and stereotypies. The management characteristics and behavioural traits associated with stereotypies were included in the same logistic regression model with stereotypies as the dependant variable.

Results: In November 2022 the inter-rater agreement was 89% and in March 2023 it was 88%. The agreement between 2022 and 2023 was 99%. Factor analysis produced 10 factors from the 41 behavioural traits. Two of these factors were associated with stereotypies, with being docile/slow/patient a reduced risk for stereotypies by 54% per unit change ($p=0.002$) and being protective/competitive/dominant a raised risk for stereotypies by 77% per unit change ($p=0.018$). From among the 20 management characteristics, 7 were associated with stereotypies. After adjustment for these factors the association of being docile/slow/patient with stereotypies was almost unaltered, but the association for being protective/competitive/dominant was no longer statistically significant.

Postgraduate

Oral Presentations

Discussion & Conclusion: Temperament characteristics are well assessed by different individuals and are stable over time, at least for several months. Horses that are docile/slow/patient are at a lower risk of developing stereotypies, whereas being protective/competitive/dominant horses are at a higher risk. Management characteristics do not explain the association of being docile/slow/patient with stereotypies, but these do appear to be more important in the association between being protective/competitive/dominant and stereotypies.

Reported temperament characteristics appear to be reliable and stable over time. Temperament is associated with risk of stereotypies in horses. Further research should identify in more detail the temperament traits associated with stereotypies and the extent to which the association can be explained by management style. Management of horses should take into account stereotypies risk based on temperament.

Acknowledgements: I would like to thank the participants who completed the questionnaires.

Postgraduate

Oral Presentations

Do Equids have the Cognitive Ability for Mirror Self-Recognition? Understanding the Role of Mirrors in the Industry to Aid Equine Welfare

Zealley, I. & Scofield, R.M.*

Oxford Brookes University, Headington, Oxford OX3 0BP

Keywords: Equids, Self-Recognition, Mirror, Welfare

Introduction: The understanding of equine cognitive ability for Mirror Self-Recognition (MSR) will aid in training, handling, and particularly welfare by clarifying why using mirrors reduces stereotypical behaviour. They may provide a distraction, or the reflection could be perceived as another equid or itself (Cooper and Albentosa, 2005). To comprehend the equid's ability for MSR, the Mark Test (MT) is the method utilised by this experiment. Gallup (1970), pioneering this technique, used it to successfully show MSR in chimpanzees with aim of removing a mark from their face, having observed the mirror. Together with Plotnik *et al.*, (2006) Four Behavioural stages, must be completed to guarantee the presence of self-recognition, confirming whether a species has the ability for MSR. This may help understand why mirrors are successful at reducing stereotypical behaviours in horses stabled or travelling alone.

Methods & Materials: The four scenarios from the MT, were performed on 14 horses of different breeds, sex (mare and geldings) and ages (4 to 26 years old), all experienced with mirrors. The 7 by 12-metre testing area was set up in a familiar arena. To create the mark, yellow tape was attached to either side of the face. The horses were tested for five minutes in the four scenarios:

1. Mirror covered, no mark (S1).
2. Mirror uncovered, no mark (S2). As a baseline for any mirror-directed behaviours expressed.
3. Mirror covered, with mark (S3). Any mark interaction would be due to the horse feeling the mark as the mirror is covered, failing the MT.
4. Mirror uncovered, with mark (S4). Interactions with the mark having observed the mirror successfully completes the MT.

Handler left the area to reduce interference and each scenario was filmed, reviewed, and desired behaviours were tallied, as stated in the ethogram.

Results: Using ANOVA, Minitab determined the significance between the different scenarios and desired behaviours. The outcome of the tests showed only three significant data sets; S2 across all behaviours ($F=4.15$, $d.f.=7.00$, $P<0.001$), S3 across all behaviours ($F=3.99$, $d.f.=7.00$, $P=0.001$), and the behaviour of Selective Attention (SEA) across all scenarios ($F=10.45$, $d.f.=3.00$, $P=0.000$). The other 12 ANOVA tests showed no significance.

Postgraduate

Oral Presentations

Discussion & Conclusion: The outcome of the results suggests that the MT was unsuccessfully completed, due to no significant indication of mark interaction through scratching of the face or head shaking in S4. There was statistical significance in S3 suggesting they could feel the mark further corroborating the failure of the MT. Plotnik *et al.*, (2006) supports this outcome as not all stages were successfully achieved. The horses achieved Stage One, physical mirror inspection and Stage Two, social responses. However, Stage Three, the starting of mirror understanding and Stage Four, the recognition of oneself in the mirror were not achieved. From a welfare perspective, significant changes in behaviour when the mirror was covered and uncovered indicated by SEA results, implies that the success of the mirror in reducing stereotypical behaviour is possibly due to the distraction provided rather than the equid recognising equine reflection or indeed themselves.

References:

Cooper, J. and Albentosa, M. (2005) Behavioural Adaptation in the Domestic Horse: Potential Role of apparently Abnormal Responses Including Stereotypic Behaviour. *Livestock production*, 92(2), 177-182.

Gallup Jr, G. (1970) *Chimpanzees: self-recognition*. *Science*, 167, 86-87. DOI: 10.1126/science.167.3914.86

Plotnik, J., de Waal, F., and Reiss, D. (2006) Self-Recognition in an Asian Elephant. *Proceedings of the National Academy of Sciences*, 103(45), 17053-17057.

Postgraduate

Oral Presentations

Investigation of mental toughness in equestrian sports.

Kaminska, B. & Davies, E.*

Hartpury University, Hartpury, Gloucestershire, GL19 3BE, UK

Keywords: Rider, Psychology, Confidence, Performance

Introduction: Mental Toughness (MT) is a psychological construct developed in an athletic population representing three dimensions: confidence, constancy, and control. It helps in the delivery of mental skills - which were found to be essential components of successful athletic performance (Zhou, 2022) - by enabling athletes to avoid destruction and therefore, to perform to their potential. Besides the impact on performance, MT was also found to enhance well-being (Ajilchi *et al.*, 2021) which has a positive effect on the longevity of a sporting career (Santos and Sagas, 2022). To date, MT has not been studied in the equestrian population. Considering its positive impact, the research aimed to investigate MT in equestrian sports to equip practitioners with knowledge of how MT looks in riders and to develop effective psychological interventions to enhance equestrian performance in the future.

Material & Methods: An online survey designed using Microsoft Office Forms was shared worldwide for 42 days on social media. The Sports Mental Toughness Questionnaire (SMTQ14), which measured three subscales of MT: confidence, constancy, and control, on a four-point Likert scale anchored by "not at all true" and "very true" was implemented into the survey. Equestrian-related closed-ended questions were added, and one open-ended question was asked for a level of a rider. A questionnaire was aimed at riders over 18 years old riding at least twice a month. A survey took 5 minutes to complete and a total of 294 responses were used for analysis (95%CI, ± 5.6 M.E.). Data were analysed using SPSS (IBM, Version 26) including descriptive statistics; the Kruskal Wallis Test for the difference between MT subscales and the number of horses owned, loaned or leased and disciplines, and the Mann-Whitney U Test for the difference between MT subscales in international and national riders.

Results: Equestrians overall scored moderately on confidence ($M = 15,62 \pm 4,21$), high on constancy ($M = 12,34 \pm 3,19$) and low on control ($M=8,69 \pm 2,92$). Kruskal Wallis Test showed a significant difference ($H(6) = 6.233$, $p = 0.017$) in control between participants who owned, loaned, or leased more than five horses ($M=10.5$) and those who owned, loaned or leased less ($M = 9$), and no difference in MT subscales between dressage, show jumping and eventing riders ($p>0.05$). The Mann-Whitney U Test showed a significant difference ($U = 5381$, $p = 0.019$) in confidence between riders who competed at least once in international equestrian competitions ($M = 17$) and those who did not ($M = 16$).

Postgraduate

Oral Presentations

Discussion & Conclusions: Results indicate that riders possess a moderate belief in themselves, have consistent training conduct and have poor emotional control and perception of being personally influential. There is no difference in MT between Olympic disciplines, riders who own, loan, or lease more than five horses have more control and those who competed at least once in international equestrian competition are more confident, therefore more mentally tough. The findings from this study are beneficial to coaches, riders, and professionals to understand the concept of MT and use it as leverage when focusing on rider development to enhance rider performance. Moreover, it brings sports psychologists' attention to work on riders' belief in themselves and emotional control for better performance and rider's well-being.

References

Ajilchi, B., Mohebi, M., Zarei, S., & Kisely, S. (2021). Effect of a mindfulness programme training on mental toughness and psychological well-being of female athletes. *Https://Doi.Org/10.1177/10398562211057075*, 30(3), 352–356.
<https://doi.org/10.1177/10398562211057075>

Santos, J. C., & Sagas, M. (2022). Differential Effects of Sport Type and Sport Category on Time Demands and Well-Being of College Athletes. *International Journal of Human Movement and Sports Sciences*, 10(1), 22–30. <https://doi.org/10.13189/saj.2022.100104>

Zhou, M. Y. (2022). Sport psychology in coaching: Improving the personality traits and thinking skills of basketball players. *Thinking Skills and Creativity*, 46, 101115.
<https://doi.org/10.1016/J.TSC.2022.101115>

Postgraduate

Oral Presentations

Exploring the relationship between equine qualifications and equine quality of life.

Wright, A., *Knight, C. & *Stones, N.

University Centre Sparsholt, Winchester, U.K.

Keywords: Equine quality of life, Stakeholder knowledge, Equine welfare.

Introduction: Equine quality of life (EQoL) has been at the forefront of discussion within the industry due to the rise in popularity of equestrian sports over the last decade (Holmes and Brown, 2022). Stakeholder knowledge and understanding of EQoL assessment tools appear to be influential on equine welfare (Raw et al., 2020). This study aimed to investigate the level of stakeholder qualification in relation to the understanding of EQoL and assessment tools.

Materials & Method: A survey was created using Google Forms and was posted on multiple social media groups (n=102), targeting UK equestrians. The participants were asked how familiar, how important, and how easy to use the following EQoL assessment tools were; the Five Freedoms, Animal Welfare Indicator Network, Welfare Assessment Protocol and Equid Assessment Research. The majority of questions consisted of Likert scales and multiple choice. Data were then categorised and analysed using Chi-squared on Minitab.

Results: The responses (n=102) were categorised into two groups: (1) with equine qualifications, ranging from equine level 2 diploma and BHS level 1 through to equine postgraduate degree and BHS AI, (n=76) and (2) without (n=26). The data were then categorised further: (1) Participants that have heard of the assessment tools and (2) Participants that had not heard of the assessment tools. For the chi-squared analysis, the four assessment tools' results, for participants with an equine qualification, were combined into two groups: (1) participants that have heard of the four assessment tools and (2) participants that have not heard of the four assessment tools (table 1).

Table 1: P-value results from Chi-squared analysis of participants, with an equine qualification, responses to the four EQoL assessment tools.

	Have heard of EQoL assessment tools.	Have not heard of EQoL assessment tools.
Familiarity	P=0.001	P=0.089
Importance	P=0.004	P=0.047
Ease of use	P=0.016	P=0.019

Postgraduate

Oral Presentations

Discussion & Conclusion: Participants in both groups with equine qualifications, regardless of whether they had heard of EQoL assessment tools or not, were significantly ($p=0.004$) able to identify the importance of these tools and their application. This suggests that possessing an equine qualification plays a key role in supporting EQoL, and in turn, equine welfare.

The results from the chi-squared highlighted that there is a significant difference ($p=0.001$) between participants, which do have an equine qualification, and who have and have not heard of the four assessment tools. The results also show that there is a difference between being familiar with the four assessment tools and ease of use. This could suggest that even though EQoL assessment tools are widely known, EQoL assessment tools are either not used widely, or that stakeholders, no matter their qualification status, need more specific support from equine welfare organisations and charities.

This research, which explores the relationship between equine qualifications and EQoL, has highlighted the need for further research. Specifically, more needs to be understood from a leisure stakeholders' point of view to a competitive stakeholders' point of view.

References

Holmes, T.Q. and Brown, A.F. (2022). Champing at the Bit for Improvements: A Review of Equine Welfare in Equestrian Sports in the United Kingdom. *Animals*, [online] 12(9), p.1186. Available at: <https://www.mdpi.com/2076-2615/12/9/1186/htm>.

Raw, Z., Rodrigues, J.B., Rickards, K., Ryding, J., Norris, S.L., Judge, A., Kubasiewicz, L.M., Watson, T.L., Little, H., Hart, B., Sullivan, R., Garrett, C. and Burden, F.A. (2020). Equid Assessment, Research and Scoping (EARS): The Development and Implementation of a New Equid Welfare Assessment and Monitoring Tool. *Animals*, 10(2), p.297.

Postgraduate

Oral Presentations

A qualitative interview study to explore factors influencing horse owners and managers practices relating to equine internal parasite management.

Donovan, M. & Collins, R.*

Hartpury University, Hartpury, Gloucestershire, GL19 3BE, UK

Keywords: Anthelmintic resistance, Worming diagnostics

Introduction: Anthelmintic resistance is a global issue in equine helminth control. It has been exacerbated by traditional worming approaches and there is evidence of resistance to all current drugs used for worming horses. With no new anthelmintic drugs being developed for horses, resistance of parasites is a growing threat to welfare and the sustainability of grazing and keeping horses (Nielsen, 2022). Modern practices such as utilising diagnostic testing prior to the application of worming offer a key role in controlling the current level of anthelmintic resistance, however anecdotal evidence suggests that blanket worming practices still occur within industry settings. This study aims to investigate the barriers and facilitators influencing decision making of equine owners worming practices, to better understand the challenges of human behaviour change in this area (Michie *et al.*, 2011).

Material & Methods: Ten semi-structured interviews were conducted either online via MS Teams or by phone call with horse owners/managers using their horses for purposes of leisure, competition, and business. The interview style was adapted from Furtado *et al.*, (2021), and participants recruited using convenience sampling via Facebook. Participants were unknown to the interviewer to limit social desirability bias. Participants were questioned on their equine involvement and experience, management practices, and prompted to bring up the subject of parasite control themselves through questions surrounding pasture and parasite burden management. Interviews were recorded, transcribed, and analysed using thematic analysis.

Results: Key themes influencing parasite management were; lack of communication regarding parasite control between owners and veterinary professionals (with confusion of scientific terminology), traditional practice (influencing willingness to change, engagement with research/education, and confidence in diagnostics), and environment (yard type, rules, and management).

Discussion & Conclusion: The themes identified exposed a need for increased contact between owners and veterinary professionals into optimal parasite management and diagnostic testing. It was highlighted that scientific language was hard to comprehend, and the diagnostic process can be overcomplicated. Participants identified the logistics of undertaking FEC's as a barrier to best practice - largely accounted to delivery of the samples, and many stated that it would be easier if collection of samples coincided with something else, e.g., regular veterinary visits.

Postgraduate

Oral Presentations

Having reminders sent about conducting the diagnostic tests or a designated testing day to suit larger yards was mentioned as being desirable to increase ease of use. Awareness of the function of FECRT's was low, however participants were interested in undertaking these, provided the process was simple, to ascertain whether worming had been successful. The use of FECRT's should therefore be emphasised during conversations between professionals and owners. In such communications, scientific language should be made more understandable by using lay terms, highlighting the importance of diagnostic testing. Support should be given to livery yard owners to help manage parasite burdens on their yards, especially with large quantities of horses. This support would influence behaviour change through the COM-B behaviour model factors (Michie *et al.*, 2011). Further research should increase sample size to allow quantitative data on participants demographics to be related to behaviour.

References:

Furtado, T., Perkins, E., Pinchbeck, G., McGowan, C., Watkins, F. and Christley, R., (2021). Exploring horse owners' understanding of obese body condition and weight management in UK leisure horses. *Equine Veterinary Journal*, 53(4), pp.752-762.

Michie, S., Van Stralen, M.M. and West, R., (2011). The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implementation science*, 6(1), pp.1-12.

Nielsen, M.K., (2022). Anthelmintic resistance in equine nematodes: Current status and emerging trends. *International Journal for Parasitology: Drugs and Drug Resistance*, 20, pp.76-88.

Postgraduate

Oral Presentations

Exploration of a simple equine cognitive ‘toolkit’ to advance stakeholders’ knowledge of equine ability.

*McLean, S.G. *, Jackson, S.A., Hodson, H.L., Johnson, E.E., Andrews, M.F. & Scofield, R.M.*
Oxford Brookes University, Headington, Oxford OX3 8UP

Keywords: Laterality, Choice, Memory, Equine ability

Introduction: Many experiments investigate the repertoire of equine abilities, including laterality, colour preference tests, and memory trials. When considering horses today, scientific studies provide vital knowledge for stakeholders to embed welfare issues across all sports however knowledge of equine cognition is still lacking (Furtado *et al.* 2012). Therefore, using a series of tests in a combined experiment may provide a useful toolkit for demonstrating the innate equine skillset to advance stakeholders’ knowledge of equine ability.

Material & Methods: Six college horses of varying breeds, heights and sex were used in four created Tests consisting of colour, memory, and laterality preferences. Test 1 (T1) involved the cohort moving forward from a square halt to ascertain lateral preference (which leg was moved forward first), both with and without a distracting novel object (36 trials). Test 2 (T2) involved a choice of left or right to discover preferred lateral movement around a barrier to an appetitive reward (18 trials). Test 3 (T3) consisted of choosing between two buckets of differing colours to discover any preference with both containing an appetitive reward (36 trials). Test 4 (T4) explored the cohort’s memory in a delayed response experiment where horses were watching as a ‘correct bucket’ was filled with an appetitive reward and placed next to an ‘incorrect’ bucket with no reward. After a delay of 30 seconds horses were allowed to approach either bucket (36 trials). Data were processed through Minitab21[®].

Results: Analysis of T1 revealed a left lateral preference without distraction ($F=27.2$, $d.f.=1$, $p<0.001$), but no preference with distraction ($F=0.00$, $d.f.=1$, $p=1.00$). Analysis of T2 suggested a lateral preference to take the right-hand side path around the barrier ($F=15.18$, $d.f.=1$, $p<0.001$). T3 revealed horses had no preference in eating from a bucket either from choice of colour ($F=0.07$, $d.f.=1$, $p=0.79$) nor choice of direction (left or right) ($F=0.74$, $d.f.=1$, $p=0.39$). The analysis of T4 indicated the colour of bucket did not influence their choice after a 30 second delay ($F=0.88$, $d.f.=3$, $p=0.45$), however overall horses were shown to significantly choose the correct bucket (with appetitive reward) after the delay ($F=4.67$, $d.f.=1$, $p=0.03$).

Discussion & Conclusions: Horses displayed clear preferences in T1, where movement started with the left leg when no distraction was presented. Interestingly, with a distraction in place, that significance vanished. Horses demonstrated a clear change of behaviour when threatened, perhaps indicating it is preferable to remove oneself from danger regardless of laterality, in direct contrast with Sinicalchi *et al.* (2014). This preference of movement was also shown clearly in T2, where

Postgraduate Oral Presentations

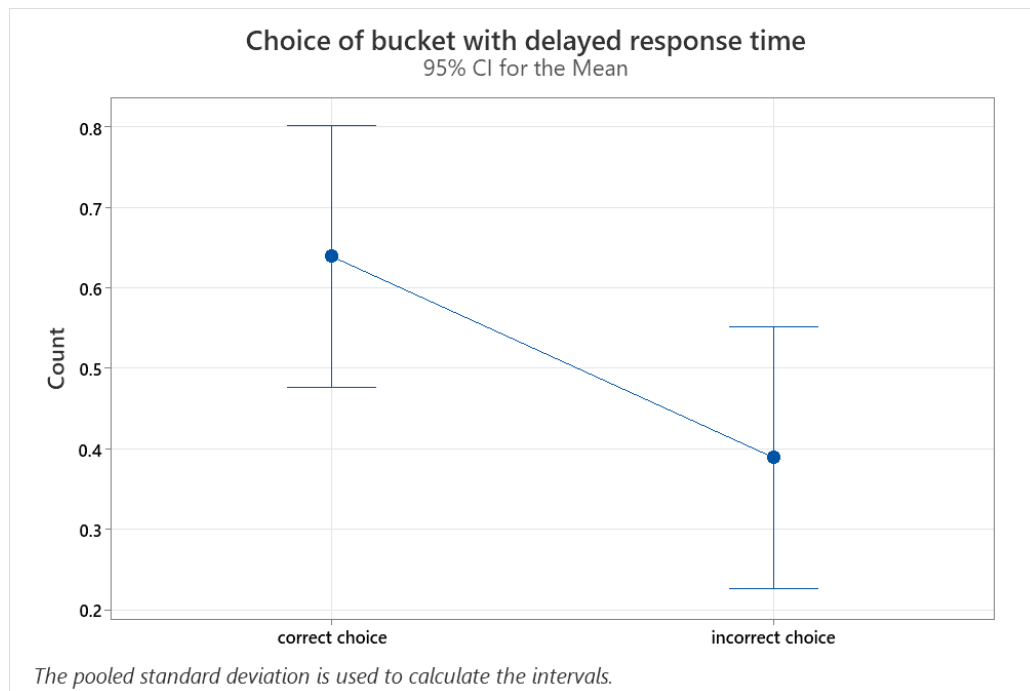


Figure 1. Result of T4 showing horses making the correct choice (bucket containing reward) significantly more times than the incorrect choice (bucket with no reward).

movement to the right was significant. T3 however did not show preference for either colour or movement. In T4, horses significantly chose the correct bucket regardless of colour, perhaps suggesting its relative unimportance when remembering where the reward was located. The demonstration of place memory capability in T4 was reported by Wishaw and Burke (2021) where ridden horses remembered the location of objects. These tests appear to provide some evidence for a toolkit to show horses can choose and remember – a positive step to supporting its use for demonstrating equine cognitive ability to stakeholders.

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Postgraduate

Oral Presentations

An investigation into the relationship between hay soaking time and properties of effluent.

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Keywords: Environmental pollution, Hay soaking, Bacterial analysis.

Introduction: Hay soaking is a pre-feeding treatment used in the equine industry as a method of controlling symptoms of respiratory diseases and equine obesity (Durham et al., 2019). The effluent by-product of soaking hay contains substances and particles removed from hay over the soaking period (Argo, Dugdale and McGowan, 2015). By investigating the variation in properties of effluent over a range of soaking periods, this study aimed to determine what considerations should be accounted for in determining a feeding regime and disposing of effluent from soaking hay. As water disposed of incorrectly can contaminate drinking water sources, which may pose a threat to human health.

Material & Methods: One-kilogram samples ($n=6$) of randomly selected meadow hay samples were soaked in 45 litre of tap water in a 70 litre plastic tubs. Variables were measured over a 24-hour soak period, samples were collected before hay was added to the water and every hour for the first four hours and a final collection at 24 hours ($n=42$). Water samples were collected by submerging a sterile collection container and allowing to fill, the collection container was then closed under the water to prevent cross contamination. Water temperature was measured at the same time of water sample collection. Bacteria was counted on a manual counted on a colony counter, pH was analysed with a pH probe, alcohol by volume was measured with the use of a refractometer and concentrations of nitrate, nitrogen and ammonia were all analysed by a Vapodest distillation system with a series of distillations and titrations. Minitab 19.2020.2.0 software package was used to determine the normality. Pearson correlation test or a Spearman correlation test were used to determine the regression values of the data. A two-tailed t-test was performed to determine any differences between bacterial colony count at 0 and 24 hours soaking.

Results: Results can be seen in Table 1. A strong positive correlation was found between bacterial colony counts and length of soaking period when hay was soaked for 4 hours ($r_p = 0.954$, $df = 3$, $p = 0.012$). This correlation was, however, not present for when averaged across the 24-hour period ($r_p = 0.447$, $df = 4$, $p = 0.374$). Alcohol by volume also had a strong positive correlation between concentration and soak time ($r_s = 0.845$, $df = 4$, $p = 0.034$). For all other variables there was no correlation between length of time and measured values. Concentrations of nitrogen were found to be above 5 mg/l, which is defined as safe to drink.

Postgraduate

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Table 1. Mean levels of alcohol, nitrogen, ammonia, nitrate and bacterial colony count throughout the soaking period, significance level at 4 and 24 hours and standard deviation

Time	Mean				
	Bacterial colony count	Alcohol by volume (%)	Nitrogen (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)
0	399.83	0	4.61	5.61	20.44
1	530.5	0	8.81	10.66	38.87
2	564	0	6.15	7.46	27.10
3	790.5	0	6.04	7.35	26.72
4	776.83	0.167	8.57	10.42	37.91
24	591.5	1	6.60	8.01	29.19
Significance level at 4 hours	0.012*	N/A	0.444	0.437	0.442
Significance at 24 hours	0.374	0.034*	0.983	0.983	0.981
Standard deviation at 4 hours	±168.1	N/A	±1.800	±2.174	±7.931
Standard deviation at 24	±150.6	±0.400	±1.613	±1.948	±7.106

Discussion & conclusion: The results suggest that, where appropriate for a horse's dietary needs, soaking time should be kept to a minimum as soak time is correlated to number of bacterial colonies present. Further research is required to further understand the type and nature of bacterial colonies present in soaked hay. Bacterial contamination of water supplies also poses a threat to human and environmental health. Given the high bacterial counts and nitrate concentrations, it could be suggested that stakeholders should consider disposing of hay soaking effluent via a foul water sewage system in order to reduce environmental impact.

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Postgraduate

Oral Presentations

Functional Asymmetry in Performance Horses: Wither and Pelvic movement In-Hand and in a Free and Working Posture Ridden at trot.

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Keywords: Asymmetry, Biomechanics, IMUs, Posture

Introduction: Equine symmetry is highly valued in performance horses; however, the biological principle of variation suggests complete symmetry is unattainable. The wither and pelvis are utilised in clinical lameness examinations as anatomical landmarks for movement observation. Asymmetry and lameness differentiation is important, along with how conditions influence asymmetric movement. This study's aim was to determine the impact of posture by investigating differences between free (minimal rider-influence) and working posture (emulating training/competition) when ridden in rising trot, compared to In-Hand (unridden), on wither and pelvic symmetry of performance horses, on a straight line.

Methodology: Wither and pelvic movement of 20 performance horses (age 10 ± 3 years), considered sound by their owners and a veterinary surgeon, were analysed at trot in two ridden conditions, Free-Posture (FP) and Working Posture (WP), and unridden, In-Hand (IH), on a straight 36m soft-surface track. Each horse's trial speed was <0.2 m/s of those previous, limiting speed-induced outliers. Condition order was randomised, with horses being warmed up pre-analysis. Saddle fit was verified by qualified saddle-fitters (all were deemed acceptable), ensuring minimal saddle interference. Data was collected using inertial sensors (100Hz) placed on both *Tubera Coxae*, sacrum (S3), and withers (T6), recording Minimum (MinDiff) and Maximum (MaxDiff) vertical displacement difference and HipHike difference (HHD). A One-Sample Kolmogorov-Smirnov Test was utilised in SPSS, followed with linear mixed model, to assess bivariate & inferential statistics.

Results: This study found significant differences between ridden and unridden conditions but no significance between ridden conditions. Rein significantly influenced landmark asymmetry (wither MaxDiff $p=0.004$; sacrum MinDiff & MaxDiff and HHD $p<0.001$), bar wither MinDiff ($p=0.381$). HHD showed significant difference between study conditions on the right rein only, particularly In-Hand, showing asymmetry difference increased compared to FP ($p<0.001$) and WP ($p=0.045$). Ridden postures induced greater asymmetry than IH, particularly pelvic asymmetry; sacrum MaxDiff (right rein) WP=-6.36mm, FP=-8.77mm, IH=-1.39mm ($p<0.001$). WP showed greatest asymmetry variability, however, IH condition induced greatest forelimb-related asymmetry (mean wither MinDiff=-3.42mm). Directionally, asymmetry increased in outside forelimb and outside hindlimb push-off phase, and outside hindlimb loading-phase when ridden, with IH values showing left-directional asymmetry. 20/20 horses had >1 trial with asymmetries exceeding thresholds by McCracken et al., (2012) (T6/S3/HHD). Asymmetry values and p -values are within *Table 1*.

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Table 1 - The average values (mm) of the asymmetry parameters in the three conditions (in-hand, ridden in a free posture, and ridden in a working posture) and their p-values.

	Wither MinDiff (Mean)	Wither MaxDiff (Mean)		Sacrum MinDiff (Mean)		Sacrum MaxDiff (Mean)		HHD (Mean)	
		L REIN	R REIN	L REIN	R REIN	L REIN	R REIN	L REIN	R REIN
In-Hand (mm)	-3.42	0.53	0.97	0.79	0.27	-1.39	-0.13	-4.66	-3.27
Free Ridden (mm)	-2.02	-2.33	4.35	-2.82	3.27	-8.77	7.40	-7.61	2.93
Working Posture (mm)	-1.90	-3.59	4.19	-3.82	4.04	-6.36	5.24	-5.55	0.49
p-value between reins	<i>p</i> =0.211	<i>p</i>=0.004		<i>p</i><0.001		<i>p</i><0.001		<i>p</i><0.001	
p-value between conditions	FP-IH: <i>p</i> =.331 WP-IH: <i>p</i> =.250 FP-WP: <i>p</i> =1.000	FP-IH: <i>p</i> =.022 WP-IH: <i>p</i><.001 FP-WP: <i>p</i> =.651	FP-IH: <i>p</i> =.003 WP-IH: <i>p</i> =.005 FP-WP: <i>p</i> =1.000	FP-IH: <i>p</i> =.002 WP-IH: <i>p</i><.001 FP-WP: <i>p</i> =.919	FP-IH: <i>p</i> =.003 WP-IH: <i>p</i><.001 FP-WP: <i>p</i> =1.000	FP-IH: <i>p</i><.001 WP-IH: <i>p</i><.001 FP-WP: <i>p</i> =.091	FP-IH: <i>p</i><.001 WP-IH: <i>p</i><.001 FP-WP: <i>p</i> =.134	FP-IH: <i>p</i> =.246 WP-IH: <i>p</i> =1.000 FP-WP: <i>p</i> =.635	FP-IH: <i>p</i><.001 WP-IH: <i>p</i>=.042 FP-WP: <i>p</i> =.291
FP = ridden in a free posture, IH = in-hand, WP = ridden in a working posture. The bold <i>p</i> -values indicate a significant difference.									

Discussion & Conclusions: In agreement with Kallerud et al., (2021), unriden movement in this study produced lowest asymmetric amplitudes, suggesting ridden asymmetry variance stems from rider-influence. Rein influence on asymmetry within this study contradicts Dyson (2014), while suggesting laterality and riders impose significance due to differences between reins and ridden vs unriden conditions. Equine asymmetries exceeding thresholds is apparent in research, provoking threshold discussion, as consideration of functional asymmetry in sound horses is limited. This study gave beneficial insights into ridden vs unriden influences on asymmetry, however further research is warranted to gauge a deeper functional asymmetry understanding.

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Postgraduate

Oral Presentations

A pilot study investigating under-rug temperature and the nocturnal behavioural profile of the stabled horse.

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Keywords: Equine, Behaviour, Rugging, Temperature

Introduction: Due to its functional importance, evidence surrounding equine sleep is growing (Greening and McBride, 2022), however current animal welfare guidelines fail to provide guidance on how best to facilitate equine sleep. For example, a reduction in core body temperature is a significant cue to sleep onset in most mammals, however little is known about how rugging practices affect this, considering that horses experience thermal stress in environmental temperatures exceeding 25°C, (Padalino and Raidal, 2020). Using novel equipment and measurements, the aim of this study was to determine whether differences in equine sleep phase durations/ frequency of wakefulness were observed with different under-rug temperatures.

Materials & Methods: A convenience sample of riding school horses (3 geldings; mixed breeds, ages, heights) were observed over three consecutive nights (19.00–07.00) using an infrared CCTV camera system. Horses were rugged according to their individual needs in-line with normal husbandry practices on the yard. Duration of sleep and frequency of wakefulness were recorded using continuous focal sampling against a pre-determined ethogram (Greening et al., 2021). Under-rug body temperature was recorded using Thermochron iButton® Loggers attached to the underside of the horse's rug, positioned caudally to the highest point of the left wither. Due to the pilot nature of the project, data were analysed descriptively. A novel sleep quality index (SQI) score was determined using the following calculation = total sleep time/ total number of awakenings within sleep states lasting >3 minutes.

Results: A total of 31.5 hours of equine sleep were observed. Total sleep time averaged 9.87 (±2.05) hours per night. Horses spent on average 3.26 (±1.21) hours in standing sleep, 2.06 (±1.35) hours in sternal recumbency, 0.07 (±0.12) hours in lateral recumbency. Under-rug temperatures ranged from 15.35–30.06°C across nights and horses. A higher proportion of sleep standing (25.57% of total observation time) and wakefulness (54.36% of total observation time) and no lateral recumbency was observed in horses with under-rug temperatures of <20°C compared to >25°C (figure 1). Using the sleep quality index score, it was determined that less disturbed sleep was achieved when under rug temperatures were within the range of 20-24°C.

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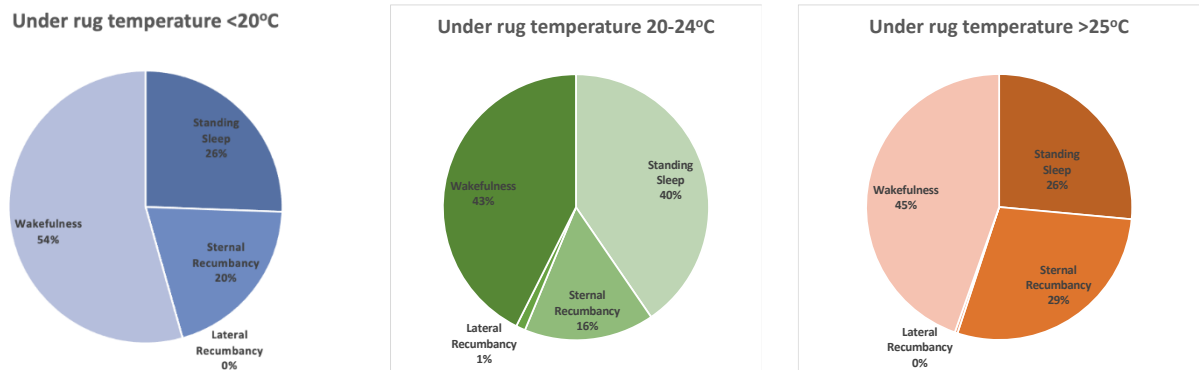


Figure 1- Nocturnal behavioural profiles (% of observed time) for differing under-rug temperatures.

Discussions & Conclusions

In relation to the association between core body temperature and sleep onset, lower under-rug temperatures did not result in a greater propensity for sleep. A lower proportion of standing sleep was observed for both under-rug temperature extremes. Meanwhile greater sleep quality and recumbency were observed when under-rug temperatures were 20-24°C, potentially highlighting an optimal under-rug temperature range to facilitate sleep in the horse. This pilot study suggests that under-rug temperature may influence the nocturnal behaviour of horses, however the small sample size and lack of a control group makes it difficult to draw strong conclusions other than this is a promising area for future research.

Acknowledgements: No other parties have contributed financially to the study. With thanks to Dhruvpal Anchan for his assistance in data collection.

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Postgraduate

Oral Presentations

The immediate effect of poles and kinesio tape on engagement of rectus abdominis and longissimus dorsi, pelvic symmetry and kinematics.

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Keywords: Taping, Cavaletti, Core, Biomechanics

Introduction: Core strength is vital in both human and equine performance, and its lack is associated with back dysfunctions including overriding spinous processes commonly treated by vets. Shaw *et al.* (2021) reported an increase in activity of core muscle *rectus abdominis* when trotting over poles and in combination with abdominal band. Similarly to abdominal band, kinesio tape (KT) stimulates mechanoreceptors and sensory pathways (Ericson *et al.*, 2020) but these effects have not been explored in equine rehabilitation. This research aimed to investigate the effect of poles and KT applied to abdomen on the activity of *rectus abdominis* (RA) and *longissimus dorsi* (LD), locomotor parameters (lumbosacral (LS) angle, pelvic symmetry, protraction and retraction) and to assess the efficiency of KT and poles in core strengthening and rehabilitation.

Material & Methods: Eleven horses (age 12±4.5years, height 156±4.5cm) were consistently trotted on a straight line in four conditions: no intervention (control); ground poles (10 cm, spaced 120±5 cm apart); KT (Biau and Burgaud, 2022); and KT and poles. Activity of RA and LD was measured using surface electromyography (Neurotrac MyoPlus 2 Pro). Three inertial sensors (Equinosis®Q) were used to examine pelvic symmetry. Reflective markers were attached to scapular spine, ventral tuber coxae and coronary bands to assess limb protraction and retraction. LS angle was defined by greater trochanter, L6 and the highest point of the withers and was assessed at forelimb midstance, maximal hindlimb protraction, hindlimb midstance, maximal hindlimb retraction of the stride. Video was obtained through iPhone XR and analysed using Quintic v.33. Data were analysed using statistical software (SPSS 27.0). Following a Shapiro-Wilk test for normality (>0.05), either Freidman's test or one-way repeated measures ANOVA were implemented to identify differences.

Results: The peak sEMG value of RA was significantly higher with poles (528.04±241.75µV) compared to KT (358.36±238.36µV, p=0.018). LS angle at maximal hindlimb protraction significantly decreased with poles (145.60±5.6°, p=0.032) and KT and poles (146.51±6.16°, p=0.008) compared to control (148.51±5.38°). LS angle further decreased at forelimb midstance with poles (147.34±6.05°) compared to control (150.27±5.59°, p=0.049). Hindlimb protraction was significantly increased with KT (Mdn=11.06°, IQR=3.36) compared to poles (Mdn=9.38°, IQR=3.75, p=0.018) and KT and poles (Mdn=9.44°, IQR=5.10, p=0.002). Hindlimb protraction decreased with poles (Mdn=9.38°, IQR=3.75, p=0.049) and KT and poles (Mdn=9.44°, IQR=5.10, p=0.006) compared to control (Mdn=10.15°, IQR=1.40). No significant differences were found for: average RA and LD activity; peak LD activity; minimal and maximal pelvis differences; LS angle at maximal hindlimb retraction and hindlimb midstance (p>0.05).

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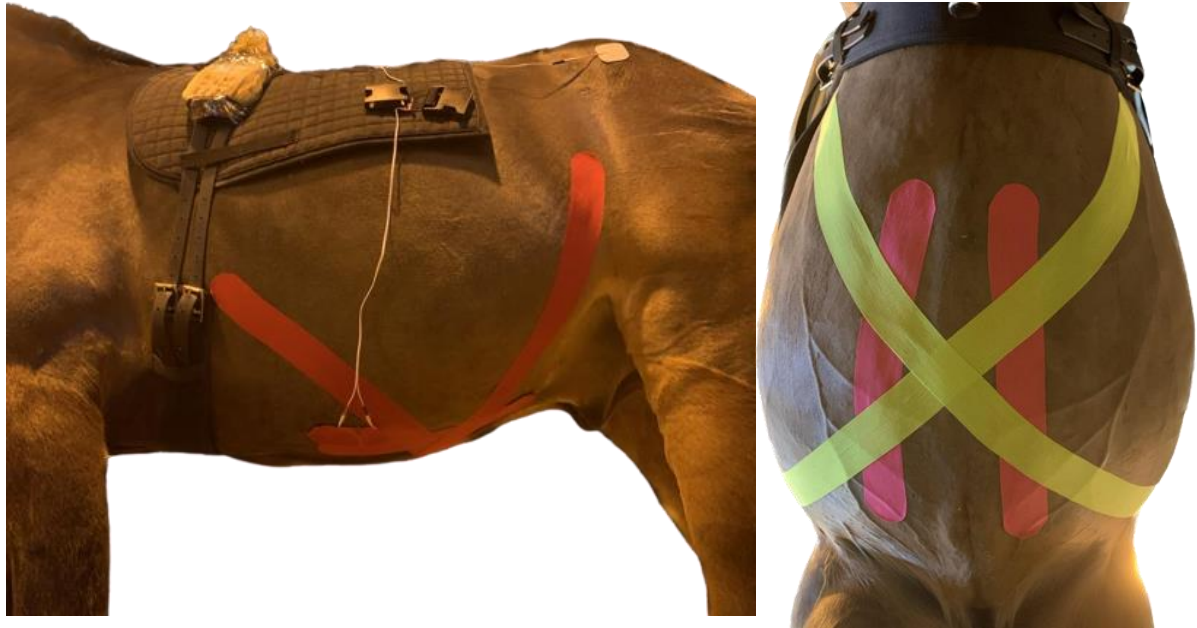


Figure 1: KT applied at 25% stretch over RA and EOA (Biau and Burgaud, 2022).

Discussion & Conclusions: Increase in RA activity over poles corresponds with previous research, indicating that poles are beneficial in core strengthening (Shaw *et al.*, 2021). Despite expected positive correlation between abdominal activity and hindlimb protraction, increased hindlimb protraction was not seen in either pole condition, which may suggest poles were restrictive to hindlimb protraction. Although poles combined with KT improved LS flexion, diagonal pattern of trot may account for limited changes. Considering KT influenced kinematics, different taping methods and their longitudinal effect need further exploration.

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Postgraduate

Oral Presentations

The Influence of Unmounted Warm-Up and Equestrian Coaching on Horse Rider Position and Horse – Rider Synergy

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Keywords: Equestrian, Position, Warm-up, Coaching.

Introduction: Horse riders communicate with horses partly through their position. A correct riding position works synergistically with the horse's locomotion (Kang *et al.*, 2010). Potential influences on position include unmounted warm-up and coaching, as studied in other sports (Fradkin *et al.*, 2004; Jowett, 2017); but, limited scientific literature exists within equestrianism. The aims of the study were to analyse the influence of unmounted warm-up prior to riding and rider coaching on rider position, and to assess the impact that rider position has on horse-rider synergy and horse performance.

Materials & Method: Riders (N=8) were videoed in all paces riding a straight line on both reins, using a high-speed camera (250 Hz), positioned perpendicularly following three sessions: 1) control, 2) unmounted warm-up, and 3) coached riding. Videos were repeated three times per trial and captured between two and three strides of horse locomotion. Quintic 2-dimensional gait analysis software was used to analyse riding positions, using markers positioned on key anatomical landmarks. British Horse Society coaches, blinded to the study, evaluated horse performance from five-minute videos at the end of each session. General Linear Models or Kruskal-Wallis (with post-hoc Mann Whitney tests) were used to identify differences in positions and coaches' marks between sessions.

In a second part, relationships between horse and rider (N=83) collective marks and overall scores were assessed from completed British Dressage competition tests (Preliminary to Elementary level). Correlation and regression were used to explore relationships.

Results: Significant differences in rider position occurred after pre-ride warm-up and coaching sessions ($P<0.05$). Changes occurred to the rider's trunk angle, ear-shoulder-hip-ankle alignment, and symmetry from a posterior view (angle of scapula to horizontal and trunk displacement from vertical), with the biggest change after coaching (table 1).

Coaches' marks of horse performance were significantly different between rider interventions ($P<0.01$). Coached sessions produced the highest horse performance marks, whilst control received lowest marks. There was a significant correlation between collective marks for rider position, horse performance (paces, impulsion, and submission), and the final score in BD competition ($R=89.05\%$, $P<0.05$).

Postgraduate Oral Presentations

Table 1: Statistical comparison of rider position in sessions 1 (control), 2 (unmounted warm-up) & 3 (coached).

Measured Variable	Session	Mean \pm Standard Error	P-Value
Knee Angle (degrees)	1	120.84 \pm 0.71	0.253
	2	120.95 \pm 0.71	
	3	119.74 \pm 0.68	
Elbow Angle (degrees)	1	132.24 \pm 1.09	0.156
	2	130.07 \pm 0.94	
	3	130.65 \pm 0.98	
Trunk Angle to a Vertical Line (degrees)	1	6.52 \pm 0.31	<0.01
	2	5.49 \pm 0.28	
	3	4.62 \pm 0.27	
Distance from Heel to Midline (metres)	1	0.069 \pm 0.004	0.0453
	2	0.064 \pm 0.005	
	3	0.067 \pm 0.004	
Distance from Shoulder to Midline (metres)	1	0.047 \pm 0.003	<0.001
	2	0.034 \pm 0.003	
	3	0.028 \pm 0.028	
Distance from Ear to Midline (metres)	1	0.055 \pm 0.003	<0.001
	2	0.035 \pm 0.003	
	3	0.034 \pm 0.003	
Angle of Scapula to a Horizontal Line	1	4.32 \pm 0.44	<0.001
	2	3.79 \pm 0.35	
	3	2.62 \pm 0.36	
Angle of Pelvic Position to a Horizontal Line	1	3.41 \pm 0.38	0.27
	2	3.43 \pm 0.39	
	3	2.66 \pm 0.29	
Trunk Displacement from a Vertical Line	1	3.14 \pm 0.33	0.034
	2	2.16 \pm 0.22	
	3	2.03 \pm 0.22	

Discussion & Conclusion

Coaching and warm-up both enhanced rider position by improving rider trunk angle, ear-shoulder-hip-heel alignment, and symmetry. Kang *et al.* (2010) describes the ideal rider position as one in which an imaginary line can be drawn through the body segments of the rider's ear, shoulder, hip, and heel, therefore supporting the claim that unmounted warm up and coaching have improved the rider's position. Whilst improvements were slight, this study examined immediate effects of coaching and warm-up, rather than from a long-term regime, such as that of previous literature (Fradkin *et al.*, 2004; Kang *et al.*, 2010). Results of the coaches' marks and BD competition scores suggest that achievement of a correct position allows the rider to positively influence the horse, which enables optimal horse-rider synergy and performance to be achieved. This strengthens the need for prioritisation of equestrian coaching developments.

Postgraduate

Oral Presentations

Application to Industry

Future research should focus on the rider to gather information on factors influencing rider performance. The findings of this study may be applicable in industry to aid equestrian coaches in improvement of rider position, horse performance, and horse-rider synergy.

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Postgraduate

Oral Presentations

What are you watching? Rider and non-rider gaze behaviour while watching cross-country eventing video footage.

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WINNER of the prize for
the best postgraduate
oral presentation

Keywords: Eventing, Video, Gaze, Rider

Introduction: Equestrian eventing is extensively recorded, broadcast, and viewed by a wide-ranging audience, particularly at the elite level. To optimise the value of video footage, it is necessary to understand what data can be generated from it. The visual behaviour exhibited while watching video footage can be indicative of the cognitive processes occurring at the time (Mann *et al.*, 2007) and can be influenced by the expertise level of the observer (Savelsbergh *et al.*, 2002). The aim of this study was to explore differences between rider and non-rider viewing strategies using gaze tracking methodology applied to cross-country eventing video footage.

Materials & Methods: Riders (n=8) and non-riders (n=10) viewed cross-country video clips lasting eight seconds each. Participants were categorised as riders if they rode at least once a month. The video clips were viewed on a desktop-mounted SMI Remote Eyetracking Device. The clips displayed a horse and rider approaching a cross-country fence from at least five strides away, as viewed from an oblique angle. Seven video clips were included for final analysis. Areas of interest (AOIs) were chosen to be the horse and rider unit, the fence, and anywhere else on the screen. Manual gaze mapping was conducted on two separate occasions for each participant to identify whether the point of gaze fell on the horse and rider, the fence, or another area of the screen. Intra-observer reliability testing using Cohen's kappa demonstrated that the agreement between the two coding sessions was almost perfect ($\kappa=0.96$). Kruskal-Wallis and Wilcoxon tests were conducted in R Statistical Software to identify differences in dwell time, fixation duration, and saccadic amplitude. Fisher's exact tests sought to identify differences in frequency of AOI transitions between riders and non-riders. Differences were considered statistically significant at $p<0.05$.

Results: Dwell time on the horse AOI was significantly longer than on the fence AOI for both riders and non-riders ($p<0.001$). Riders fixated for significantly longer on the fence AOI than non-riders ($p<0.05$). Riders also exhibited significantly longer saccadic amplitudes than non-riders ($p<0.05$). Frequency of AOI transitions was not significantly different between riders and non-riders ($p>0.05$).

Postgraduate Oral Presentations

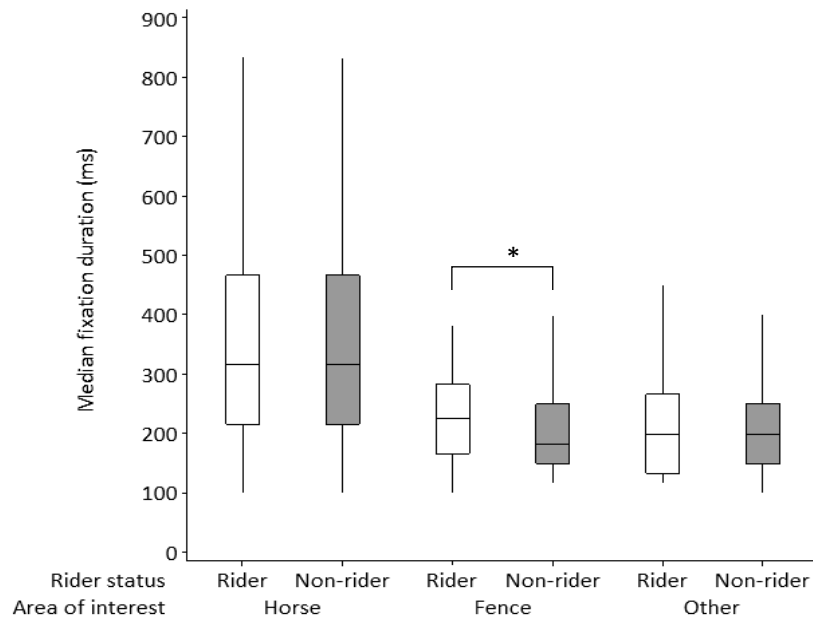


Figure 1: Riders ($n=8$) exhibited a significantly longer median fixation duration on the fence AOI than non-riders ($n=10$) while watching clips of cross-country video footage (* indicates $p<0.05$).

Discussion & Conclusions: We demonstrated that riders and non-riders perceived some elements of cross-country video footage differently, but this was not consistent across every gaze metric examined, or every AOI. Longer fixation duration on the fence AOI may have indicated that riders were gathering more information from the fence than non-riders who would have less experience with different types of cross-country fences. Riders also demonstrated longer saccades, suggesting that they moved their gaze around the screen more deliberately than non-riders. These data did not, however, distinguish between competitive level of riders, thereby warranting further investigation. These findings highlight that gaze-behaviour monitoring may have value as a low-risk and non-invasive tool to assess levels of expertise in equestrian practitioners.

Acknowledgements: Thanks go to An Eventful Life for their partial funding of the PhD project and the use of their video database.

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Undergraduate Poster Presentations

An investigation into the self-perception and ideal body image of male and female riders

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Keywords: Equestrian body image, Industry vs. self-perception, Barrier to participation

Introduction: Body Image (BI) can be defined as a combination of thoughts and feelings that an individual may have about their body (Tort-Nasarre *et al.*, 2021). Elite athletes are reported to have both an athletic and a social BI, thus BI can be measured in context of either sport or daily life (Glapa *et al.*, 2018). Among sport-specific pressures, type of sport is a predictor of body dissatisfaction, female athletes from leanness sports such as dancing and gymnastics; are seen to have higher levels of body dissatisfaction compared to those in non-leanness-based sports such as golf and basketball (Kong & Harris, 2014). This study aimed to investigate self-perception between male and female equestrians; predominantly due to social ideas that males and females are supposedly different in how they are affected by social media impressions of the ideal BI and how they perceive their BI due to these impacts.

Material & Methods: A survey was created using Google Forms that consisted mostly of Likert-scales, with some open-ended questions. The survey was distributed using multiple social media platforms including Instagram, Facebook and Tiktok and out from September until December 2022. Data were analysed using both chi-squared tests, the test of independence and goodness of fit.

Results: Of the 103 responses 87.4% (n=90) were female and 12.6% (n=13) were male. 32% (n=33) were aged between 18-25, 22.3% (n=23) 41-55 and 20.4% (n=21) 56 years and older. 78.6% (n=81) had over 10 years of experience within the equine industry. There was no significant difference between the perceived ideal BI for male equestrians in comparison to self-perceived BI (P=0.270). There was significant association between the perceived ideal BI for female equestrians and their self-perceived BI P<0.0001.

Discussion & Conclusions: The results contradict previous research investigating self-perception and perceived ideal BI in the female rider. The male response rate was significantly less than females, therefore potentially creating bias within the result. Although there has been research in BI within other athletic areas, some may now be outdated. Body image research athletes and non-athletes which has investigated BI impacting other sporting factors and the majority of these studies have been limited to a single gender lacking in comparative findings. Within the equine industry research has focused on jockeys regarding BI for the male equestrian where weight limits play an important role in athlete management. Further research is indicated to engage the male rider regarding BI and the impacts on riding. While the small number of male respondents was a drawback in this study,

Undergraduate Poster Presentations

their participation did raise some interesting issues and suggests that further focussing on male perception of equestrian BI is warranted in future.

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Undergraduate Poster Presentations

Investigation of pH in stallion semen pre- and post-cryopreservation

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Keywords: Cryopreservation, Equine, CASA, Artificial Insemination

Introduction: Equine breeding primarily focuses on performance without consideration of the reproductive capabilities of a stallion (Atroshchenko et al., 2019), resulting in poor-quality semen (Marzano et al., 2020). Stallions are classified as “good”, “average”, or “poor” freezers depending on post-thaw motility (>40%, 30%-40%, and <30% motile, respectively) (Ferreira et al., 2018; Neuhauser et al., 2019). Research within equine artificial insemination has scarce information on the effect of stallion pH on the quality of raw and cryopreserved semen. This study investigated the relationship between raw pH in stallion semen and post-thaw quality to determine if abnormal pH (<7.2 or >7.7) of raw stallion semen could identify whether the stallion was a good or poor freezer.

Material & Methods: Ejaculates ($n = 11$) from eight stallions from Stallion AI Services were collected and analysed by computer-assisted sperm analysis (CASA) (ASA system Hamilton Thorne IVOS-14) for velocity and motility. The pH value of 1 ml of each raw ejaculate was recorded using a pH probe before cryopreservation in 0.5 ml straws using an IceCube automated freezing machine. The cryopreservation media used was Ethylenediaminetetraacetic acid (EDTA) lactose extender containing 3% N-N dimethylformamide (DMF) and 20% egg yolk with a pH of 7. The straws were stored in liquid nitrogen (-196°C) until analysis. After cryopreservation, the straws were thawed (30 seconds at 37°C) and re-analysed using the CASA and pH probe. Semen viability post-thaw was assessed using the NucleoCounter[®] SP-100[™].

Results: Statistical analysis was performed in R Studio. Results showed a significant decrease ($P < 0.05$) in pH and total motility between pre- and post-thaw semen samples. Numerically, normal raw semen pH (7.2 to 7.7) had better motility (>40%). However, no correlation ($r = -0.05$) was found between raw semen pH and post-thaw motility. A moderate correlation ($r = 0.53$) was found between raw semen pH and post-thaw viability.

Discussion & Conclusion: Abnormal pH values (below 7.2 or above 7.7) were not observed in the fresh ejaculates, only normal values; therefore, the hypothesis that abnormal pH would be seen in poor motile semen could not be supported. This may be due to the small sample size; a larger selection of stallions and ejaculates would provide a better understanding. However, raw semen has better motility and higher pH values than post-thaw semen. Overall, there is an indication that cryopreservation lowers both pH and semen motility post-thaw. Utilising pH as an indicator of a stallion's semen freezability could be considered to improve artificial insemination rates, as raw pH has the potential to estimate post-thaw motility. With further research, this could be used as an indication of fertility success benefitting the equine artificial insemination industry.

Undergraduate Poster Presentations

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Undergraduate Poster Presentations

Is there an Increase in Body Temperature in Thoroughbred Broodmares During the Teasing Process?

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Keywords: Oestrus cycle, Breeding, Sexual behaviour, Thermodynamics

Introduction: Traditional methods of monitoring mares for covering involve ultrasonography, palpation, and signs of oestrus through teasing. In other species like humans, dairy cattle, and pigs, temperature tracking is used to both avoid and to achieve pregnancy as this is deemed as being a more reliable method given fluctuations of basal body temperature seen during the oestrus cycle (Bowmen, 2006; Hasson & Rahawy, 2022). The aim of this study was to investigate if there is an increase in body temperature in thoroughbred broodmares and to track the cycle of ovulation during teasing.

Materials & Method: Thoroughbred broodmares ($n=7$, mean age 12 years \pm 5.4) were teased three times a week from the 9th of January to the 5th of February at the start of the 2023 breeding season, using a teaser stallion as part of the stud's normal routine. Teasing was graded on a scale of one to five, with four and five classed as positive and one to three classed as negative (Hiney, 2017). The temperatures ($^{\circ}\text{C}$) of all the mares were recorded everyday between 15.30 and 16.00, both with ocular infrared thermography and rectal temperature to monitor changes in basal body temperature. The ocular temperature was taken three times to produce an average reading, and recorded and one reading taken from the rectum.

The readings were tested for normality. Data were nonparametric therefore a Spearman's rank correlation test was run. The average reading for ocular and rectal temperature for both positive and negative tease was evaluated, with the data being parametric, a paired t test was then run, as only two of the seven broodmares were classed as a positive tease to the stallion.

Results: Results showed a significant weak positive ($R=0.176$, $p=0.014$) correlation between ocular and rectal temperature. Mean ocular temperature for positive tease was, $35.08^{\circ}\text{C} \pm 0.476$ and negative tease $34.684^{\circ}\text{C} \pm 0.185$ however this difference was not significant ($p = 0.305$).

Mean rectal temperature for a positive tease was $37.5090^{\circ}\text{C} \pm 0.305$ and a negative tease = $37.4560^{\circ}\text{C} \pm 0.318$ however, this difference was not significant ($p = 0.110$).

Discussion & Conclusions: Rectal temperature was the more reliable reading to use to show signs of increasing body temperature during the teasing process. Due to the minor fluctuation in temperature in both ocular and rectal temperature readings that could be seen as an indicator of a positive tease, there was a slight increase however it was not large enough to be significant.

Undergraduate Poster Presentations

There is some indication of increasing body temperature during the process of teasing, similar to other species, however future investigations incorporating a larger sample size should be assessed before this method can be applied to industry.

Acknowledgements: Mr Mark Weinfeld owner of Meon Valley Stud for allowing the use of his broodmares for the purpose of this study.

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Undergraduate Poster Presentations

Has Public Opinion of Equestrian Sport Changed Since 2020?

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Keywords: Equestrianism, Perception, Social license

Introduction: Social license to operate (SLO) is the unofficial agreement between the public and an organisation that an activity is considered acceptable to continue operating (Morrison, 2014; Demuijnck & FASTERLING, 2016). Equine welfare in sport is becoming a societal concern due to increasing social media coverage and awareness of equestrianism. Equestrian sport may be at risk of losing its SLO and right to self-govern if there is widespread public outrage. This enquiry has aimed to identify any change in public opinion of equestrian sports since 2020.

Materials & Methods: Data were gathered from three public Facebook™ news pages; Sky, BBC, and ITV, and two 'equestrian' based public pages; Horse & Hound and Dr David Marlin. The words: 'horse sport', 'dressage', 'showjumping', 'eventing', 'horse', and 'horseracing' were searched on each page. Horse & Hound searches included 'social license'. A total of 88 posts were recorded, with the top 10 'most relevant' comments analysed, and the number of reactions for each post. Data were categorised into 'positive', 'neutral' and 'negative'. Descriptive statistics analysing posts and reactions were calculated using Microsoft Excel. Comments were analysed using thematic analysis (Braun and Clarke, 2006) to generate key themes.

Results: Analysis of the general news sources found the number of negative posts and reactions increased post-2020 (figure 1). Dr David Marlin's page received increased engagement post-2020, however Horse & Hound had decreased engagement. Thematic analysis found four positive comment themes: 'equestrianism is unique and inspiring', 'it's in their genes', 'good that [equipment] wasn't used' and 'it's no worse than other animal use'. Themes from negative comments included: 'use of equipment and tack', 'hatred of equestrian sport', and 'greed/human gain'. Neutral commenters did not care about horse sport or were neither for nor against.

Discussion & Conclusions: Key concerns regarding horse sport included use of whips, difficulty of competition, and prevalence of death and injury during and post competitive career. Many felt horseracing should be banned, and even positive posts received negative responses. Positive commenters felt others only seem to have an issue with equestrianism when there is media attention. Some felt that equestrianism is inspiring and unique to watch. Limitations of this enquiry include the inability to determine the reasoning behind individuals' choice of reaction, as this can be dependent on the nature of the post. The data is indicative of those who have chosen to interact with the posts.

Undergraduate Poster Presentations

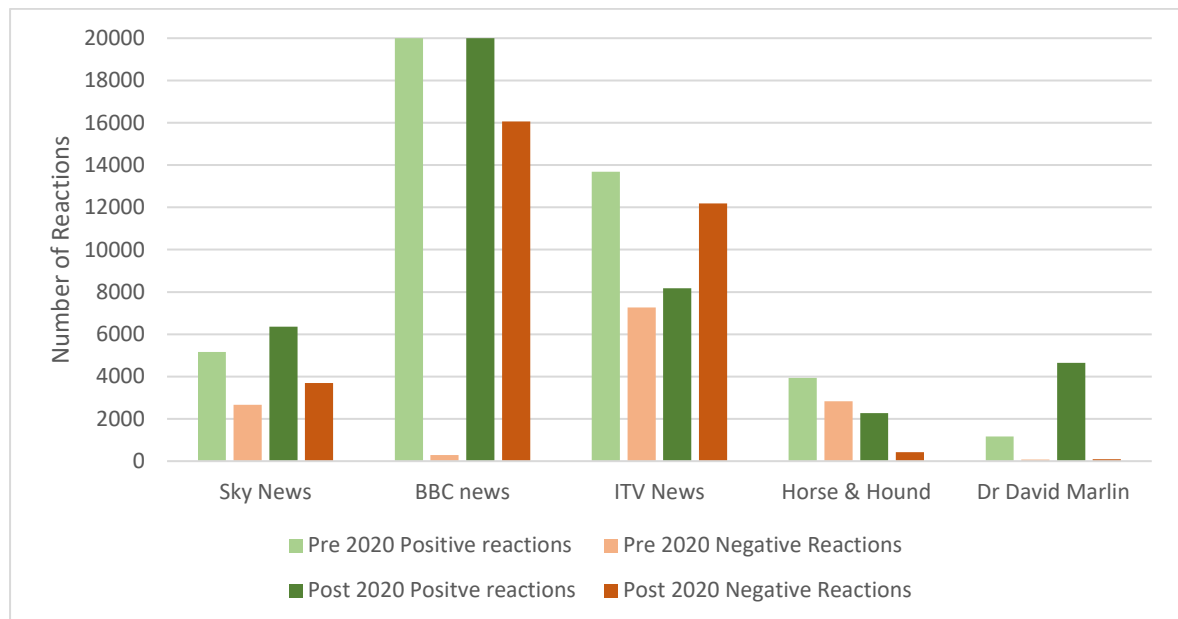


Figure 2: Pre & Post 2020 Positive & Negative Reactions to Equine News Posts (BBC positive reactions capped at 20,000+ as pre 2020 positive = 158450, and post 2020 positive 34454)

This enquiry found the number of negative posts from news pages and number of negative interactions/comments in relation to equestrian sport has increased since 2020. This confirms growing concern regarding the use of horses in sport, suggesting that equestrianism may be at risk of losing its SLO. The industry must prove its legitimacy and credibility to maintain public trust and improve and justify industry practice where needed. Future research should further investigate public perceptions of equestrianism, and equine welfare practices in sport.

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Undergraduate Poster Presentations

Evaluating the effect of reinforcer valence on equine response rate of an operant task with respect to interspecies social bonding.

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Keywords: Behaviour, Positive reinforcement, Cognition, Training

Introduction: Food and tactile stimulation are common rewards utilised in positive reinforcement (PR) based training practices. As incentives are generally delivered from the handler, associations between handlers and food rewards are a mediator for affiliative interactions whereas discrepancies between consumer purchasing preferences and equine palatability preferences present complications (Francis *et al.*, 2021). Additionally, interspecies social bonding (ISB) is a preliminary area within the horse-human dyad in comparison to companion animals such as cats and dogs. Based on this, the study aimed to evaluate PR as a variable of bond within the horse-human dyad by assessing reinforcer valence.

Material & Methods: The study design was inspired by previous canine research conducted by Feuerbacher and Wynne, (2012). Six horses ($n=6$) were recruited to measure the frequency and latency (s) of response rate for an operant task (target touch) when receiving three different valued reinforcers (Approx. 25 g carrot, a handful of hay and 4 s wither scratching (WS)) in protected contact (a physical barrier (stable door) between horse and handler for safety purposes). Data was collected randomly for a total of 6 non-consecutive days. After completing a conditioning phase with a hay reward, all subjects were exposed to each three-minute condition twice and on an alternating schedule (WS, hay, carrot, WS, hay, carrot) for a total of 6 sessions. The sample population was also assessed in two groups to analyse latency (s) and frequency in response to their respective handlers; privately owned horses and their owners (*owned*, $n=3$, average ownership 7.4 ± 6.12 years) and random livery horses and random handlers (*random*, $n=3$, limited to no association with the handler). IBM SPSS version 18.0.0.0 (190) statistical software was used to run a repeated measures ANOVA to assess differences in response rate to each reinforcer.

Results: The response rate was significantly increased with carrot when compared with hay (19.17(95% CI, 7.36 to 30.97, $p=0.007$) and with WS (26.67(95% CI, 3.230 to 50.103, $p=0.030$) (Figure 1). Additionally, a paired T-Test highlighted an increase in motivation to receive a hay reward after receiving a carrot reward $t(5) = -2.714$, $p = 0.042$. Pearson's Chi² showed that owned horses had a higher response rate in comparison to the random group $\chi^2(1) = 5.720$, $p = 0.017$. No differences were found in task response latency under any conditions.

Undergraduate Poster Presentations

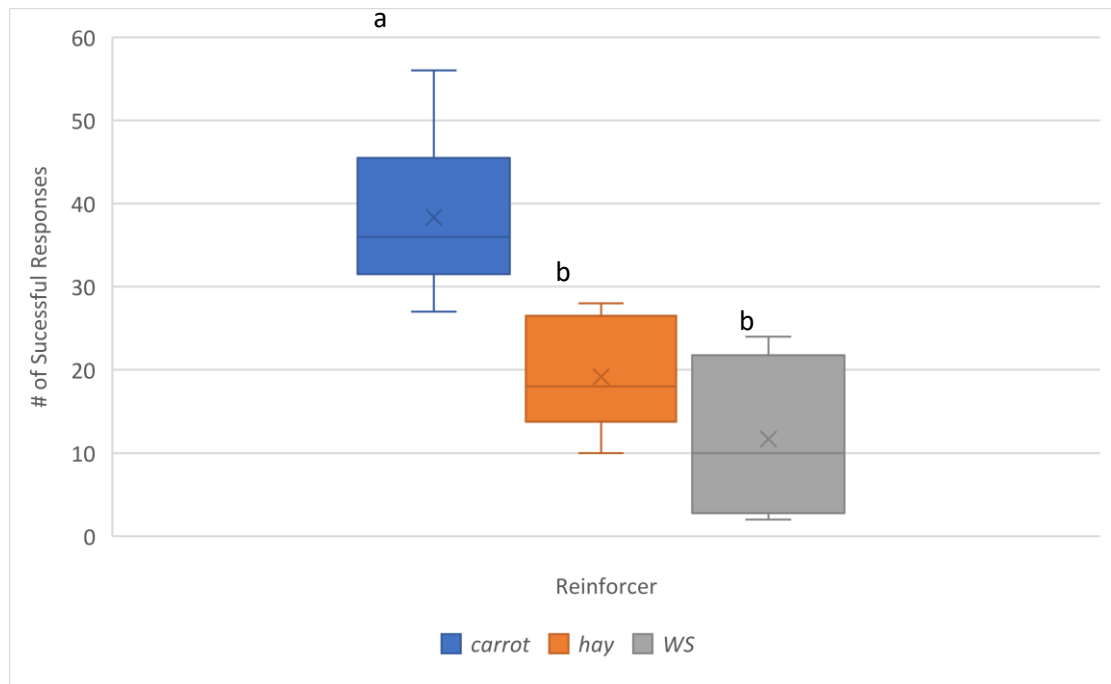


Figure 1: Total number of successful target touches measured (mean \pm SD) in horses ($n=6$) during an operant task for receiving three different reinforcers carrot, hay, and wither scratching (WS) (a: $p < 0.05$, b: $p > 0.05$).

Discussion & Conclusions: All subjects preferred the highest value reinforcer in comparison to *hay* and *WS*. Based on the salience of the chosen reinforcers and previous literature (Kieson *et al.*, 2020), reinforcer valence is likely to be contingent on its availability and alternating reinforcers of various salience may be used to prompt motivation for more complex behaviours as well as increase the valence of lower value reinforcers. Higher response rate of *owned* horses in comparison to *random* horses is indicative of an increase in feedback value when received from a preferred associate. Although PR alone may not be the determining factor of a prominent ISB, it may aid the development and maintenance of positive associations as well as familiarity which encourages affiliative interactions.

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Undergraduate Poster Presentations

Observing Conflict Behaviours Whilst Lunging in Training Aids that Promote Open and Closed Head and Neck Angles: A Pilot Study

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Keywords: Lunging, Conflict behaviours, Head and neck angles, Training aids

Introduction: Lunging is routinely used as a way of exercising horses from the ground, and training aids are commonly used to create an outline or to ask the horse to work harder. Up to 82% of respondents have reported to use training aids whilst lunging. There is currently a lack of research surrounding lunging and conflict behaviours in general, and research is conflicting when looking at riding in training aids which promote a closed head and neck angle. The aim of this study was to observe conflict behaviours horses expressed when lunging with training aids promoting an open head and neck position (chambon) and a closed head and neck position (rubber bungee).

Material & Methods: Four horses were lunged on an eighteen-meter circle for five minutes. The lunging procedure was one-minute walking followed by two and a half minutes of trotting on both the left and right rein. This lunging procedure was repeated three times. Once for the chambon, once for the rubber bungee and once for a control lunge wearing just the lunging roller. All horses wore their own bridle, boots, and a high withered saddle pad. A random number processor was used to dictate which training aid was used in which order. The study was recorded, and conflict behaviours were noted using an ethogram (table 1). The data were extracted using MiniTab 21©, and significance was determined using a series of one-way ANOVAs.

Table 1 : Ethogram adapted from Mullard et al. (2017) and Dyson et al. (2018)

Behaviour	Description
Mouth Gaping	Opening of the horse's mouth
Tongue sticking out	Tongue visible
Chewing the big	Visibly chewing the bit
Head shaking	Tossing up or down
Spinning	Turning >150 degrees
Behind the vertical	Behind the vertical for >5 strides
Breaking gait	Unexpected change in gait
Unwilling to go forward	More than one forward cue needed
Bucking or kicking out	One or more hindlimb above the ground
Turning head	Turning the head to the inside or outside

Undergraduate Poster Presentations

Results: When horses were wearing the rubber bungee the results showed a significant increase in chewing the bit ($F=4.50$, $d.f.=2$, $P=0.044$) and working behind the vertical ($F=13.36$, $d.f.=1$, $P=0.011$) when compared with the control group of no training aid however, this was not seen when comparing the control group to the horses wearing a chambon.

Discussion & Conclusion: The significant difference in conflict behaviours when wearing the rubber bungee could be due to the heightened complexity in working with a closed head and neck position as increased difficulty under saddle has been linked to a rise in conflict behaviours however further research would be needed to support this. The difference in conflict behaviours could also be due to this specific training aid's slow pressure release. Comparisons could be made to a cross-under bitless bridle, which has been theorised to have a slow pressure release and is linked to an increase in certain conflict behaviours (Scofield and Randle, 2013). These findings could help give owners and trainers more understanding of the influence these training aids have on their horses' behaviours. Further studies with a broader range of horses and training aids may support these results.

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Undergraduate Poster Presentations

The Effect on College Horses Ridden by Students with Differing Capabilities in Relation to the Expression of Conflict Behaviours

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Keywords: Conflict Behaviours, Novice riders, Welfare

Introduction: Equestrian sport has captured a larger following in recent years and therefore has been more apparent to the public, whilst also causing a growing concern for the welfare of horses. Understanding behavioural traits of horses is vital to achieve safe human-horse relationships, as horse's behaviour when ridden is of key importance for performance and well-being (Luke *et al.*, 2022; Graf *et al.*, 2013) It has been suggested there is no correlation regarding discrepancies with horses' ridden behaviour and rider incompetence (Luke *et al.*, 2022). However, it has been speculated novice riders are more likely to contribute to behavioural and performance concerns compared to intermediate riders. This contradicting research generates concern for the mental and physical effects college horses endure, as they are often used by novice or beginner riders. A search of the literature suggests there is little to no research on conflict behaviours and college/riding school horses. The aim of this study is to assess whether student riders impact the horse negatively through observation of conflict behaviours demonstrated by the horses between the two groups of riders.

Material & Methods: Ten riders and five horses were chosen through random sampling out of the college students available for the study. Riders were split into two groups, five in each: learner rider (still learning to ride but had the ability of walk and trot with the use of a lead rein) and novice rider (working off the lead rein in walk, trot and canter, but were not vastly experienced). The horses were ridden once by the learner rider, then by the novice rider the next day and the rider order was randomised. The horses were assessed in an Intro A dressage test. The Riding Horse pain Ethogram (Dyson *et al.*, 2018), edited to 21 behaviours, was used for observing and recording the frequency of conflict behaviours for data collection. The data were analysed using Minitab®.

Results: Results demonstrated a significant difference between the two groups. Significantly more conflict behaviours were observed with learner riders than novice riders ($P < 0.05$). When examining individual behaviours, significance was found in sclera exposed ($P = 0.041$) and tail swishing ($P = 0.049$).

Undergraduate Poster Presentations

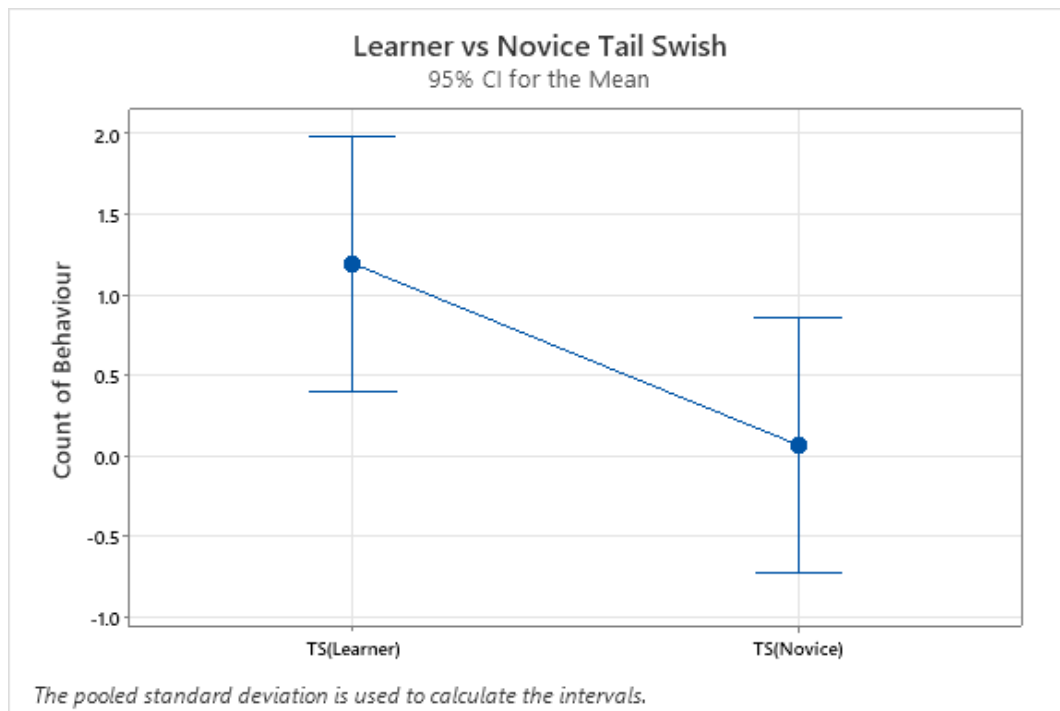


Figure 1: Graph demonstrating results comparing tail swishing between novice and learner riders.

Discussion & Conclusion:

There seems to be some evidence that using horses to teach students to ride is causing detrimental effects to horse welfare, which is being demonstrated through expression of conflict behaviours. This research suggests there is a possibility for changing the way students are taught to ride horses. New methods could include using a mechanical horse, therefore allowing new riders to understand the horses' movements and spend time getting to know the importance of the horse rider dyad.

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Undergraduate Poster Presentations

How does the perception of dominance impact equine training and management?

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Keywords: Dominance, Training, Behaviour, Welfare

Introduction: Dominance is often mentioned when training horses however, views regarding dominance may differ. Professionals within the equine industry may also perceive dominance differently with trainers such as Parelli (2001) stating that dominance and leadership are essential for training equines, while the International Society of Equine Science (2017) believe that it is unethical to use dominance. How people view factors such as dominance may influence training and management practices. The aim of the study is to understand how people within the equine industry perceive dominance and how these views impact the training and management of horses.

Materials & Methods: After pilot testing questionnaire was piloted, an online questionnaire was distributed via various equine Facebook group. An opportunity sample was used which consisted of 145 participants. The target participants were people over 18 years old who owned horses or worked within the equine industry. The survey consisted of a mix of qualitative and quantitative questions. The qualitative data were analysed using content analysis. The quantitative data was analysed using chi-squared goodness of fit and Kruskal Wallis tests on Minitab 2019.

Results: When participants were asked to explain the term dominance 36% used aggressive terminology such as words like 'pushy', 'bully', 'forcing' and 'boss'. Twenty percent of participants described dominance as 'being in control', while 19% described it as 'establishing a hierarchy'. Out of the participants who believed it is important for humans to establish dominance with the horse, 35% mentioned 'using reinforcement' and 19% mentioned 'using groundwork'. Twelve percent of participants believe dominance is established by 'handling the horse confidently' and 7% believe it is established by 'punishing bad behaviour'. In training 'establishing hierarchy' was viewed as least important and 'horse personality' was seen as the most important (*figure 1*, $P < 0.001$). When deciding which horses to turn out together, 'temperament of the horses' and 'level of dominance' were seen as the most important factors while 'size of the horse' was seen as the least important factor.

Discussion: Despite 36% of participants using aggressive terminology to describe the term dominance, only 7% of participants mentioned punishment when asked how they would achieve this with most participants mentioning groundwork. Henshall and McGreevy (2014) suggest that training practices used to establish dominance often involve using groundwork and that horses learn during these sessions as a result of habituation and conditioning. These same principles underpin many other traditional horse training practices, which may suggest that belief in dominance does not influence the training principles applied. Alternatively, people may just be unwilling to admit that they use punishment when training.

Undergraduate Poster Presentations

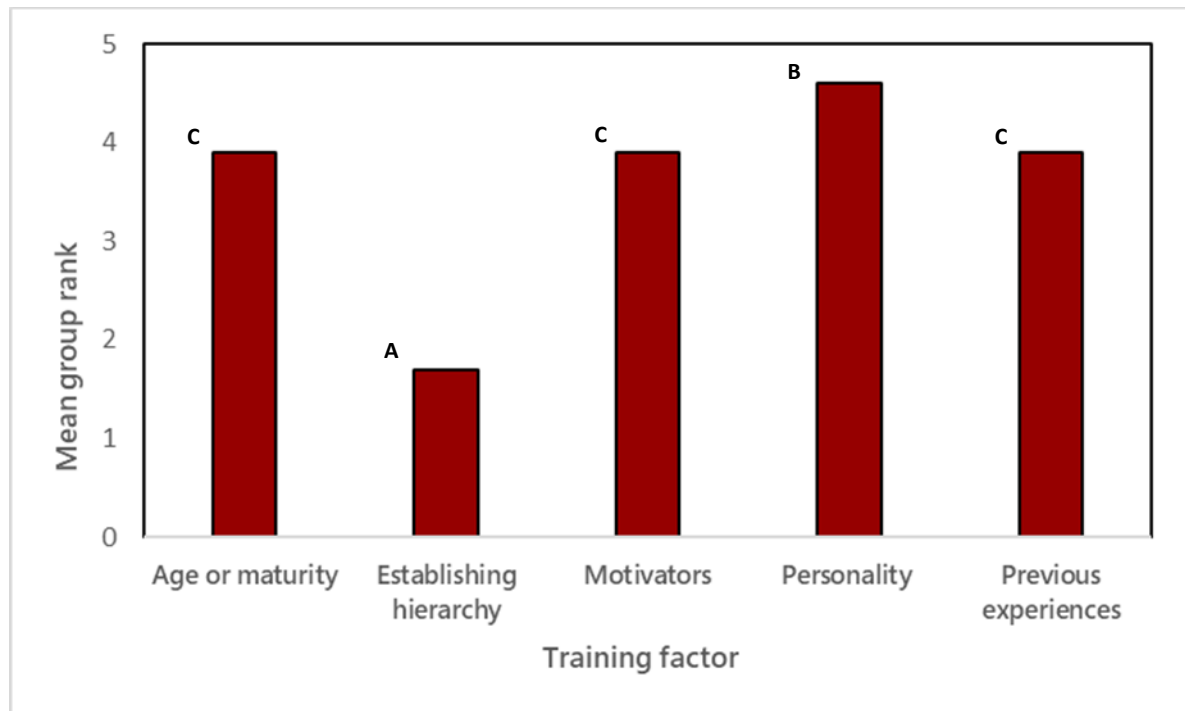


Figure 3: Ranking how important participants believed the following factors were when training equines. Groups sharing a letter are not significantly different ($H_4=170.59$; $P<0.001$).

Dominance is generally seen as unimportant when training horses but one of the most important factors when deciding which horses to turn out together. The results show that dominance is seen as not being important in the horse-human relationship but believed to be a key factor in the relationship between equines. The results imply that people within the equine industry believe that the way people interact with horses during training should be different to how horses interact with other horses.

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Undergraduate Poster Presentations

The Effect of Physiotherapy on the Equine Stride Length

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Keywords: Stride length, Locomotion, Physiotherapy, Range of motion

Introduction: Stride length is a vital factor in equine athletic performance due to the varying effects it has on locomotion. Physiotherapy may be viewed as significant when assessing equine kinematics, in particular the length of stride. There are clear correlations between related manual therapies and individual practices that suggest possible positive effects of physiotherapy on stride length through improvements in joint range of motion (ROM) and flexibility (Haussler, 2009). The aim of this study was to assess ROM through determining the affecting factors of stride length, analyse any changes in stride length and thus assess the impact of physiotherapy as one of these affecting factors.

Materials & Methods: This study investigated the effects of physiotherapy treatment on the equine stride length in the walk of a cohort of horses progressing through a rehabilitation programme. 9 horses stabled at the same yard received specified physiotherapy treatment bi-weekly for six weeks. Data were collected via video recordings once per session of every horse each of the six weeks with the horses walking-up on the same surface separately. The first video recording occurred where the horses had received no physiotherapy treatment to form a baseline stride length. Each video was analysed using the app OnForm© to calibrate and measure twelve stride lengths per horse in metres. Data were entered in Minitab21© and processed using a series of one-way Analyses of Variance.

Results: Results suggest that in all strides there is an increase in length with the first physiotherapy session, in strides one, three, and five the increase in stride length was statistically significant for all nine horses ($P=0.022$, $P=0.007$, $P=0.038$, respectively). In particular, weeks one to three showed significant results for all strides where the first physiotherapy treatment took place in week two ($P=0.000$). Where data did not show a statistically significant difference in stride length, a graphical difference was noted showing a similar pattern of increase in measurement between weeks one and three for all nine horses and remaining at an elevated level to week six.

Discussion & Conclusion: These results seen in Figure 1 showing the stride lengths for all nine horses combined, imply that physiotherapy has a lengthening effect on stride length whether this is through increasing ease of movement, joint ROM (Rose *et al.*, 2009), or reduction of pain (Peham *et al.*, 2001). This can also be seen in the results over the full six weeks where a graphical difference depicts a gradual increase in stride length until week three, which remains high until week six.

Undergraduate Poster Presentations

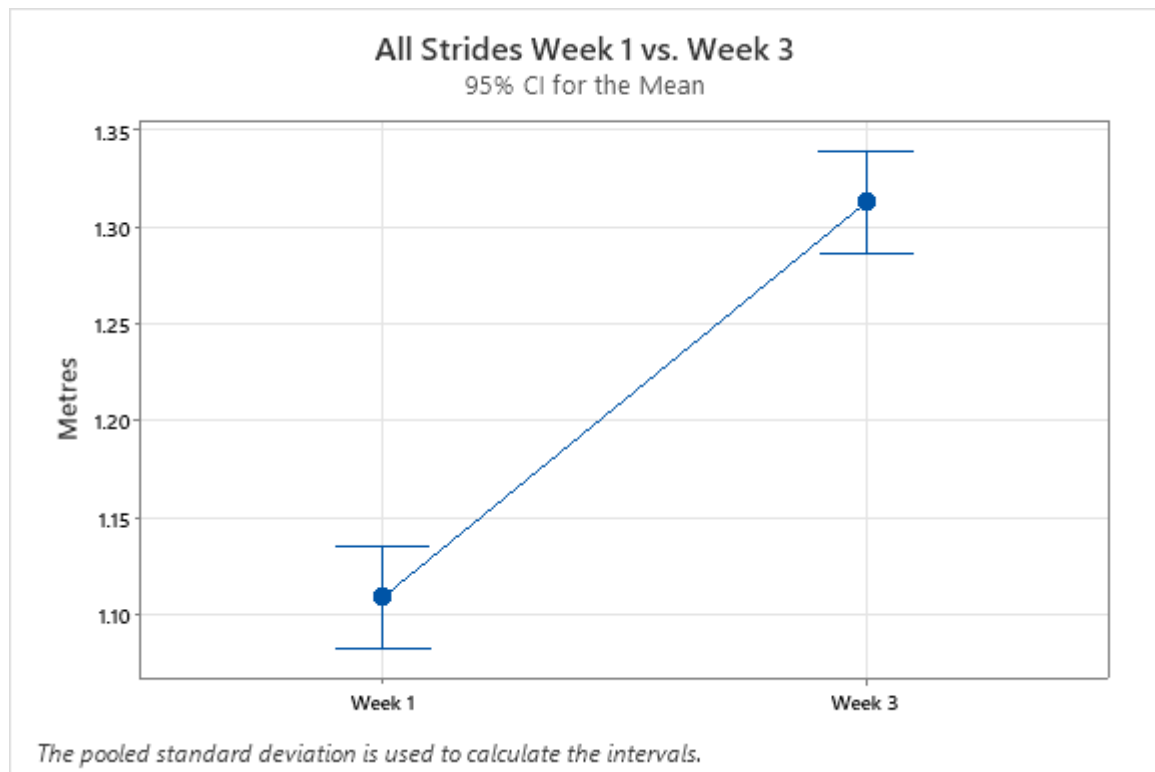


Figure 1: A graph depicting the difference in stride length measurements for all strides in week one and week three ($P=0.000$).

There are many variables that play a part in the equine stride length, indicating the difficulty of determining the true cause of an altered stride length. Furthermore, there are factors noted within the nine horses studied which signify the differing effects that physiotherapy has on individual horses depending on conformation, age, and lameness, indicating the need for further exploration into this field. Overall, it is clear that in this study physiotherapy has a link to a lengthened equine stride. This research has formed a brief basis for further development into the importance of physiotherapy on the equine means of locomotion in walk. Further research is required to confirm the consistent significance of the effect of physiotherapy on the equine stride length.

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Undergraduate Poster Presentations

Effect of four semen extenders on progressive motility and velocity of thawed-frozen equine semen at 12, 24 and 48 hours

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Keywords: Artificial insemination, Cryopreservation, Chilled semen

Introduction: The use of chilled thawed-frozen equine semen is a relatively new way of artificially inseminating (AI) and not used widely. Studies have shown chilled thawed-frozen semen could be a viable alternative to frozen or chilled AI if a mare is not suitable for frozen semen AI, the stallion was unable to collect at time of ovulation or there is not a vet skilled in frozen AI available (Prell *et al.*, 2020; Lühr, 2018; van Huelea *et al.*, 2022). If the longevity of thawed-frozen is proven to be adequate in research, it has the potential to be inseminated as if it were chilled semen. To date, there has been little research into the practicality of chilled thawed-frozen semen and no research into the effects of different extenders on this method of semen shipping. The objectives of this study were: (1) to determine one extender type produces the best motility over 48 hours of chilling and (2) if the optimum extender could be used for all chilled thawed-frozen shipments.

Materials & Methods: Ejaculates (n=45) from 36 stallions (multiple breeds; 3 to 22 years old) were collected onsite at Stallion AI Services (Shropshire, UK) and frozen. Two 0.5ml frozen straws (1ml total) were kept from each regular collection, divided equally between four test tubes and extended in four different extenders (INRA-96, BotuSemen GOLD, SperVital Red and Pasedes Quality) at a ratio of 0.25ml:2.5ml. Samples were refrigerated for 48 hours with motility (%) and velocity (scored 1-5) being tested at 0, 12, 24 and 48 hours using the Hamilton Thorne Computer Aided Sperm Analysis (CASA). Results were analysed using a repeated measures ANOVA on Genstat (22nd edition) and Fisher's Least Significant Difference test.

Results: Results showed INRA-96 produced the highest mean progressive motility at all time points after 0 hours, particularly so at 12 hours ($p < 0.05$). Pasedes Quality produced significantly lower progressive motility results at all time points after 0 hours, possibly due to a difference in ingredients or negative interaction with the freezing extender used. At 12 hours all extenders exceeded the minimum industry accepted value of 35% progressive motility. At 24 hours, only INRA-96 maintained acceptable value. However, motility for SperVital Red extender was not significantly lower (34.64%). At 48 hours all extenders were below 35% motility, therefore samples would not have been recommended for artificial insemination. Velocity scores remained at an average of 3 across all time points for INRA-96, SperVital Red and BotuSemen GOLD. Velocity scores for Pasedes Quality declined from 3 to 0 over the 48-hour period.

Undergraduate Poster Presentations

Discussion & Conclusion: It was concluded that INRA-96 is a suitable choice for most stallions to ship their chilled thawed-frozen semen. More research should be carried out on Pasedes Quality to determine the reason for poor progressive motility results in this experiment. It would be recommended that chilled frozen-thawed semen is shipped by a same-day delivery courier and inseminated within 24 hours to increase chances of pregnancy.

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Undergraduate Poster Presentations

Owner's understanding and management of their mares' oestrus cycle during equitation.

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Keywords: Mare, Rider ability, Oestrus cycle, Owner knowledge

Introduction: The oestrus cycle refers to hormone influenced physiological changes, in mares, indicating status reproduction status (Silva et al., 2017). During oestrus the mare's reproductive tract becomes inflamed leading to discomfort, which can increase during ridden work (Aurich, 2011). Mares can express this discomfort through conflict behaviours, such as bucking and rearing. The prevalence of conflict behaviours has been thoroughly researched for the safety of both horse and rider however, there is limited research surrounding the relationship between these behaviours displayed during oestrus when mares are ridden. The presence of conflict behaviours during this stage of the mare's cycle could suggest mare welfare is affected (Pryor and Tibary, 2005). The influence of owner and rider knowledge of the oestrus cycle is also limited, therefore this study aimed to reinforce the importance of owner knowledge and education, to improve overall mare welfare.

Materials & Methods: An online survey was created using Google Forms, targeted at UK equestrians (n=62) and consisted of a variety of questions, including multiple choice and Likert scales. A one variable Chi-squared test was used in order to investigate the relationship between rider ability and knowledge/management of their mare during oestrus.

Results: There was a significant difference ($p < 0.001$) between rider level and oestrus behaviours. A significant difference ($p < 0.001$) between rider ability and level of oestrus knowledge was seen, accepting the alternate hypothesis. Participants (n=48) stated their mare displays oestrus behaviours during ridden work, however a small number reported using methods to control oestrus behaviour (n=11), with the top control method being Regumate.

Discussion & Conclusions: Anthropomorphic attitudes towards a mare's behaviour can have an impact upon welfare as they are not always recognised as an indicator of reproductive pain. Significance was found between rider level and level of oestrus knowledge; however, further research is required to understand other contributory factors to this relationship and prevalence. This research indicates there is a difference in owner knowledge around mare's behaviour in oestrus, but highlights owners are not seeking oestrus suppressing products. Findings suggest more research is needed on products to support mares, and wider education of mare owners is needed. This will help improve mare welfare during the oestrus cycle.

Undergraduate Poster Presentations

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Undergraduate Poster Presentations

The Chill Factor: An Investigation into the Effects of Refrigeration at 4°C Prior to Cryopreservation of Equine Semen

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Keywords: Stallion, Semen, Cryopreservation, Refrigeration

Introduction: As the equine breeding industry rapidly grows, so does the demand for frozen semen for artificial insemination, however the cryopreservation of sperm requires further adjustment to have the efficiency and mass use observed within the cattle industry. As it is not feasible to replace stallions with poor semen freezability, it is vital to establish multiple methods for cryopreservation, enabling the adaptation of protocols to maximise post-thaw semen quality. Research into the chilling stage of the procedure is extremely limited within stallions (Crockett et al., 2001), and so this study aims to investigate the effect of chilling equine semen directly prior to freezing, and the impact that this has on semen quality post-thawing.

Materials & Methods: A total of 3 ejaculates were collected from three mature stallions with proven fertility. The gel-free fraction of each ejaculate was divided into two centrifuge tubes per sample and diluted with INRA96[®] to prevent a deterioration in quality whilst at room temperature (~20°C). Samples were cushioned with OptiPrep[™] to protect against damage during centrifugation (20 minutes at 1000g) before being further diluted with BotuSemen GOLD[™]. Using an IMV MRS1 Dual Straw Filling Machine, 0.5ml straws (Minitube, Germany) were labelled, filled, and assigned to one of the five treatment groups (5, 25, 45, 70, and 120 minutes) resulting in 10 straws per treatment (120 straws in total). Samples were stored at 4°C within a refrigerator and frozen at their specific treatment time increment before being suspended within liquid nitrogen at 196°C until analysis. 2 straws from each treatment (total = 30 straws/10 straws per stallion) were thawed and analysed to evaluate total concentration (million sperm/ml), viability (%) and progressive motility (%) using the Nucleocounter[®]SP-100[™] and computer-assisted sperm analysis (CASA, HTM-IVOS 14).

Results: Results found no significant difference between any of the chill-time increments, with no significant effect on semen concentration (P = 0.371) or viability (P = 0.253) reported, however a significant difference in motility was observed (P = 0.036). All post-thaw assessment results included within this study for concentration and viability were above the recommended levels for acceptable insemination doses (concentration = $\geq 250 \times 10^6$ [range = 320 – 275 million sperm/ml] and viability = $\geq 35\%$ [range = 57% - 46%]).

Undergraduate Poster Presentations

Discussion & Conclusion: These findings suggest that an increased period of refrigeration prior to cryopreservation does not significantly impact semen post-thaw concentration or viability but does significantly increase progressive motility. Due to a varied approach to semen cryopreservation, and a lack of research in this specific area, there is minimal scientific evidence to support the importance of this fundamental step in the cryopreservation process for stallions. This study aims to bridge that knowledge gap, by providing evidence of the preservation of stallion semen quality when stored at chilled temperatures prior to freezing. Further research is needed to identify how long semen quality can be maintained at refrigeration temperatures before freezing, and to determine if factors such as age, breed, and freezing ability impact the effect on semen quality.

Acknowledgements: I would like to thank Stallion AI Services for the use of their stallions, facilities and support.

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Undergraduate Poster Presentations

Equine (*Equus Ferus Caballus*) Proprioceptive Responses to the Application of Kinesiology Tape

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Keywords: Proprioception, Equine, Kinesiology tape

Introduction: Human and equine athletes alike have used many different methods and therapies to improve and enhance performance. Research for both equine and human athletes have contradictory results regarding the effectiveness and use of Kinesiology Tape (KT). Forelimb trajectory has shown to not be improved with the use of KT (Bockstahler *et al.* 2017); however, hock stability and movement, and increased trot stride length have shown to improve with the use of KT (Biau and Burgard, 2021; Jones, 2022). An area which has not been studied in equine athletes is the initial proprioceptive response to the application of KT. Any positive response (decreased angle of joint) could point to further effect of using KT and start discussion on how this could improve performance by increasing the range of movement.

Method & Materials: Nine horses were used (clinically sound prior and during study), ranging from 7-20 years old, 13.3-17.2 hands, and a mixture of Thoroughbreds, Warmbloods, Cobs and Irish Sports Horses. All horses were selected for their different fitness, disciplines and work levels. 6 walk repetitions were carried out on a 15 metre non-slip, concrete, flat surface. 2 repetitions were filmed directly before tape applied (BT), 2 filmed when tape was applied (WT), and 2 filmed directly after tape had been removed (AT); each filmed from one side only for each repetition. The KT was applied on the hind distal limbs, in a two-loop circular motion, from the hock medially, to the fetlock laterally. The fetlock angle was chosen as it is a clear joint to measure in Dartfish© for all horses in this study; as well as being a good proprioception indicator due to the receptive nerves in the joint. The videos were processed in Dartfish©, and the fetlock angle was measured in degrees at 0 metre, 5 metre and 10 metre markers for each repetition, in both hindlimbs, at all three markers. Overall, 684 data points were collected. A series of one-way ANOVAs were processed in MiniTab©.

Results: All data points of 0m, 5m and 10m were compared across all three measures of BT, WT and AT. There was a significant difference of fetlock angles between the three measures with WT and AT displaying a significantly lower fetlock angle than BT ($F=4.88$, $d.f.=2$, $P=0.008$).

Undergraduate Poster Presentations

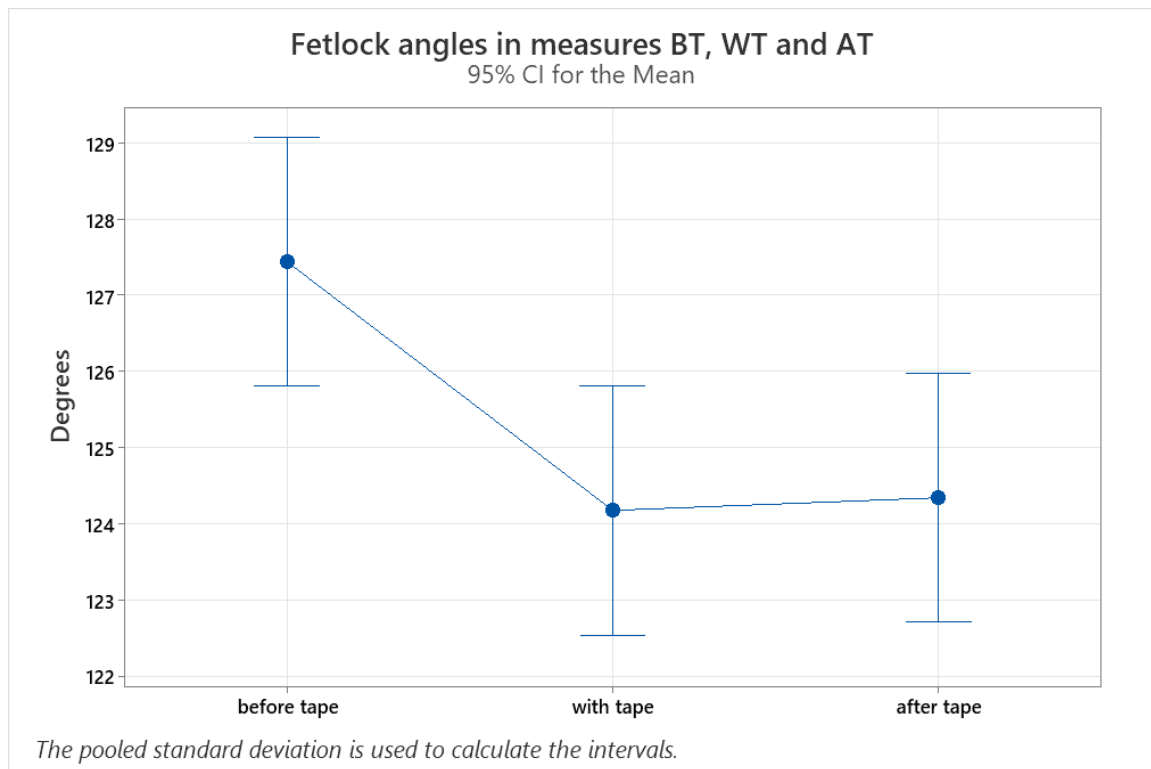


Figure 1: graph displaying significant decrease of fetlock angles when horses were wearing tape and after tape was removed compared to before tape was applied.

Discussion & Conclusions: In this study horses displayed an initial proprioceptive response to the application of KT shown by the significant decrease of fetlock angles in measures WT and AT when compared to BT. This temporary decrease in fetlock angles when KT has been applied suggests there is an effect of immediate proprioception. Future studies could explore if there is a prolonged decrease in fetlock angle past an immediate measurement to ascertain if KT could be used to enhance performance in sports horses by increasing range of movement long-term.

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Undergraduate Poster Presentations

Impact of Covid-19 on a large welfare charity between 2018 and 2022

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Keywords: Equestrian, Coronavirus, Rehomed, Health

Introduction: Coronavirus (Covid-19) was identified in December 2019 in China leading to a global pandemic being declared in March 2020. This resulted in movement restrictions with the first lockdown being announced in the United Kingdom with legal measures from March 26th, 2020. Restrictions for the industry resulted in lack of contact, altered routines for both horse and owner and potential minimised turnout or some were turned away for the initial lockdown. Major changes were brought about within the equine industry; impacting upon horse owners, livery yards and horses themselves. Williams et al, 2020 studied the impact upon livery yards and horse owners; however, welfare charities were yet to be investigated, where altered routines and management implications arose leading to changes within the horse's daily routine. Welfare concerns amongst industry stakeholders, including welfare centre managers and veterinarians, increased significantly during Covid-19 (Ward et al.,2021). The study aimed to investigate the impact Covid-19 has on equine charities and if the impact was found to be positive or negative.

Materials & Methods: An in-depth interview was conducted with a large equine welfare charity (n=1) through Microsoft Teams, a set of seven questions were asked within the interview. Each question had an attached time frame either prior to or during the pandemic to compare results, the themes which ran in the questions were based around the level of welfare cases, rehoming cases, abandonment rates. Through independent experimental design, the verbatim was extracted and inputted into Microsoft Excel then transferred to Minitab (statistical programme) where a Mann Whitney test and Two Sample T Test were utilised for data analysis.

Results: The level of welfare concerns and cases reported prior to Covid-19 compared to during the pandemic found no significant difference ($P=0.835$). The number of rehomed horses and reported rehoming cases prior to Covid-19 and during Covid-19 were found to not be significant ($P=0.877$).

Discussion & Conclusion: Covid-19 was found to have no significant difference on the equine charity prior to and during the global pandemic. The results indicate how the welfare charity was not significantly impacted upon through the overall welfare cases and horses rehomed and reported welfare cases. The charity was impacted financially due to reduced income and donations, although outgoings for the charity reduced slightly in terms of international travel through restrictions. Having only one charity within the study led to a small sample size and is likely to not be a true representation of the impact the pandemic had on UK charities industry wide. Contributing factors such as the rising horse crisis and implications of Brexit caused increased demand upon welfare charities through the number of horses needing rehoming and overall levels of welfare concerns and calls throughout the UK prior to the pandemic (Owers, 2014). Therefore, suggesting why since

Undergraduate Poster Presentations

the pandemic was declared there has been no significant difference. Furthermore, this study investigated a large equine charity which could have different financial circumstances through grants, funding, access to resources and availability of these resources to a smaller charity.

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Undergraduate Poster Presentations

Horse owner use of dynamic mobilisation exercises, training aids and massage for kissing spines surgery rehabilitation.

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Keywords: Rehabilitation modalities, Thoracolumbar pain, Lameness, Physiotherapy

Introduction: Kissing spines (KS) is a condition that effects the thoracolumbar vertebrae in horses that can cause pain as the space between the vertebrae narrows (Prisk and Garcia-Lopez., 2019). Following surgery for KS, owners employ modalities including dynamic mobilisation exercises (DME's), training aids and massage. The aim of this study was to ascertain if owners used these specific rehabilitation modalities and what their perceptions of these modalities were. This was achieved by quantifying the proportion of horses rehabilitated using DME's, training aids and massage. Furthermore, the relationship between the use of these modalities and prevalence of secondary lameness was investigated.

Material & Methods: Data were collected through a wider online survey which had 142 respondents. However, the sample size obtained from the survey questions relevant to this study was 58. Quantitative responses were analysed using frequency analyses and Chi-square tests. Qualitative data were subjected to thematic analysis to derive themes on owner perception of rehabilitation activities. Quantitative data was exported into SPSS statistics from Microsoft Excel.

Results: Findings from the survey indicated 56.9% (n= 33) of respondents used DME's, 55.2% (n=32) used massage and 81% (n=47) used training aids during rehabilitation. There was no significant association found between the use of DME's, training aids and massage and prevalence of secondary lameness post-surgery. A Chi-squared test of association was performed for each rehabilitation modality in relation to secondary lameness. For DME's there was no significant association found ($X^2(1, n=56) = 0.742, p= 0.389$) (See Fig.1). Themes derived from the thematic analysis included positive physical changes; horse and owner bond; and possible misuse and previous decisions.

Discussion & Conclusion: From this study, it was clear that the use of DME's, training aids and massage did not impact prevalence of secondary lameness. This study focused on horse-owner use of rehabilitation modalities rather than professional use which may lead to different results compared with previous studies such as Wilson *et al.*, (2018) that found 83.3% of respondents used 'stretching' with respondents being either veterinary surgeons or rehabilitation professionals. Whereas in this study, only 56.9% of horse-owners used DME's. The results from this study show that horse-owners may not be consistent in maintaining rehabilitation practices which may impact the effectiveness of modalities from having a positive rehabilitative outcome.

Undergraduate Poster Presentations

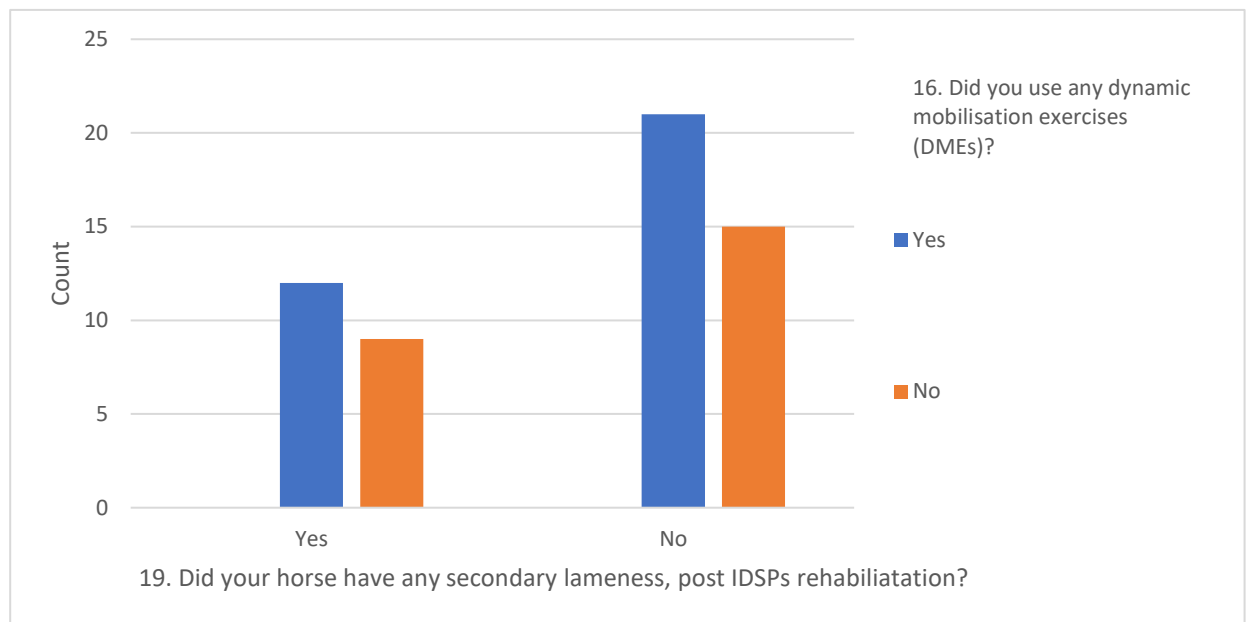


Figure 1. The relationship between the use of DME's and the occurrence of secondary lameness.

From the thematic analysis, DME's and training aids were found to 'improve muscle development' however owners found them to be 'time consuming'. There was a lack of knowledge on the use of massage therapy and surrounding the correct use of training aids. A common theme was also a lack of advice from veterinary surgeons/physiotherapists on how to use these modalities correctly during the rehabilitation process. Phrases such as, 'vet advised the Pessoa, physio advised against' indicated conflicting advice. The results from this study agree with findings from previous studies, highlighting a need for increased owner-education and involvement from veterinary surgeons/physiotherapists during rehabilitation. Additionally, further research is needed on the use of rehabilitation modalities following KS surgery (Sayers and Tabor, 2022).

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Undergraduate Poster Presentations

United Kingdom Highway Code Changes, Have They Improved Horse and Rider Safety by Reducing Incidents of ‘Near-Misses’? A Retrospective Study

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Keywords: Road safety, Highway code, Near-misses, Horse

Introduction: A large proportion (84%) of United Kingdom (UK) equestrians use the road to exercise their equids but often experience conflict with other road users (Pollard and Furtado, 2021). Incidents on the road occur mainly in the form of ‘near-misses’ and encompass any occurrence of a perceived dangerous situation by horse and rider, but no physical harm is caused. Road user conflict affects perceived risk resulting in reduced road use for all vulnerable road users affecting welfare and well-being (Pollard and Grewar, 2022). In an effort to improve road safety, the Highway Code was amended on 29th January 2022, categorising horses in the same vulnerability class as pedestrians and cyclists. The study objectives were to provide evidence to support or contradict if regulatory changes successfully reduced ‘near-misses’ and provide useful information and recommendations to road safety stakeholders.

Material & Methods: To identify if ‘near-misses’ had reduced in the year succeeding the Highway Code changes (and what other circumstances may have affected ‘near-miss’ numbers), an anonymous online questionnaire (n=324) was employed and distributed to a broad equestrian demographic via Survey Monkey[®] therefore using a convenience sample. Questionnaire data were exported into a Microsoft Excel[®] spreadsheet for preliminary data sorting and statistically analysed using Minitab 21[®]. One-Way Analysis of Variance (ANOVA) tests with a 95% confidence interval were used to identify any statistical difference between the two periods. Ethical approval was obtained from Abingdon and Witney College Ethics Panel.

Results: No significant difference was found between the number of ‘near-misses’ and the two time periods ($F=2.45$, $DF=1$, $P=0.118$). 91% of respondents were aware of the Highway Code changes, and 96% of respondents wore a form of safety equipment. Speed and proximity were the two largest contributors to ‘near-miss’ occurrences. Graphically there was a small increase of ‘near-misses’ in 2022-2023 compared with 2021-2022 (Figure 1).

Discussion & Conclusions: No significant difference in ‘near-misses’ between the two periods suggests the Highway Code changes had not improved road safety for equestrians. A small increase in ‘near-misses’ (Figure 1) may result from equestrians using the road more often due to increased confidence post-Highway Code change. A ‘One Health’ approach to tackling road safety for vulnerable users could be suggested (Cociu *et al.*, 2023). Equestrians valued the use of safety equipment in an attempt to make road use safer, and the majority were aware of the Highway Code changes.

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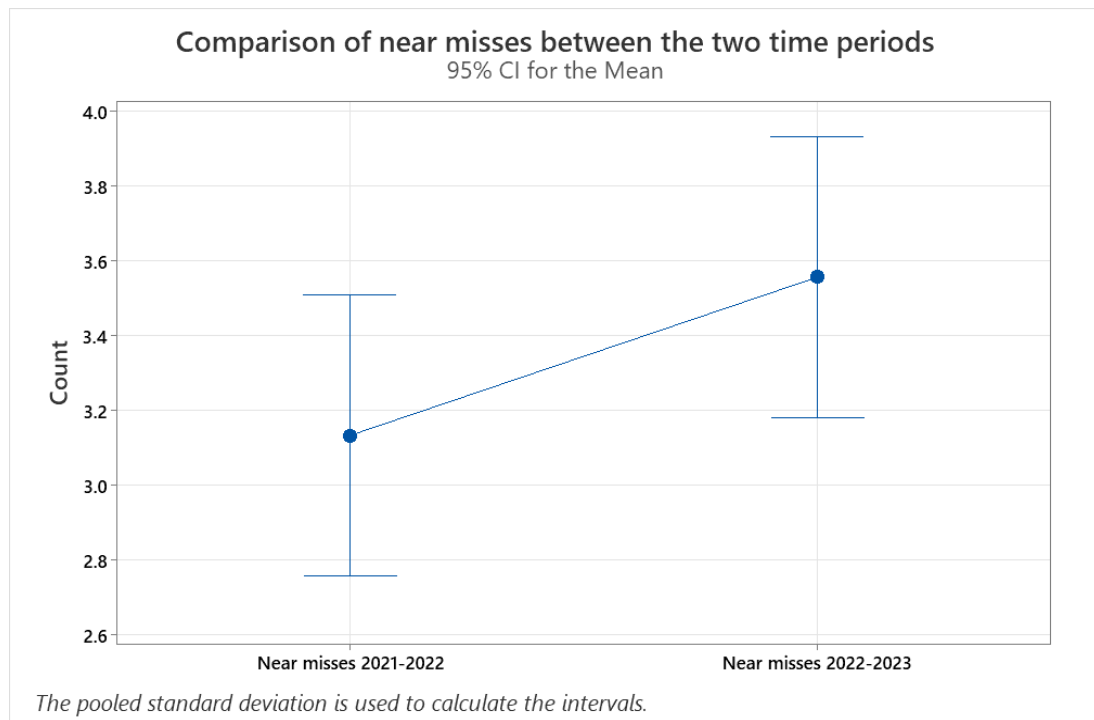


Figure 1. Interval plot graph.

Highway Code change details seemed to favour other vulnerable road user groups (pedestrians and cyclists) in educational literature and campaigns by road safety stakeholders. Road user education and focused road safety campaigns highlighting the Highway Code changes for horses may make the road safer for equestrians protecting their welfare and well-being. Interview-based studies of road users and their views of vulnerable road users using thematic analysis may provide useful insight into how to combat road user conflict and support equestrians' social licence to operate.

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Undergraduate Poster Presentations

An investigation into female riders' body image perception differences across equestrian disciplines.

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Keywords: Self-image, Body positivity, Equine

Introduction: Research available for female athlete's body image perceptions within equine sport is limited. Fornio *et al.* (2021) found that the majority of female riders considered a smaller body image as 'ideal' for the female equestrian with the majority identifying themselves as larger than this 'ideal'. There was also a perceived coach and judge bias against larger horse riders but wider disciplines that were not subjectively judged were not explored individually. The aims of the study were to investigate body image perceptions of female equestrians across a wider range of disciplines. Achieving this through measuring relationships between body image perceptions of riders in each discipline and evaluating the effects of body image size and perceptions in association with participation, in order to identify barriers to participation.

Material & Methods: Following institutional ethical approval Ethics 2022-56, a 25-question survey, created in Microsoft Forms, was distributed across the social media platform Facebook, from January 2023 to March 2023. Inclusion criteria were limited to over 18s, participating in an equine discipline at any level, and living in the United Kingdom (UK). Pearsons' Chi-squared (χ^2) were used to test associations between participant responses and discipline for closed questions. Thematic analysis was utilised for qualitative responses following the six-step model.

Results: In total, 74 responses were gained. 19 respondents participated in dressage, 23 in showjumping, 10 in eventing, 7 in showing and 12 in other disciplines. There was a significant relationship between discipline and riders' belief that negative body image is a concern ($\chi^2= 15.582$ $p = 0.048$) and between general clothing size and the ideal clothing size for the female equestrian ($\chi^2= 63.585$ $p= 0.001$). There was a significant association between general clothing size and whether comments have been made on participants body shape and size by coaches and judges ($\chi^2= 32.603$ $p= 0.001$). Main themes of 'body image', 'weight and diet', 'emotional and mental impact' and 'industry perceptions' were identified within the thematic analysis of the open worded answers relating to body image perceptions and satisfaction with size in comparison to the 'ideal'.

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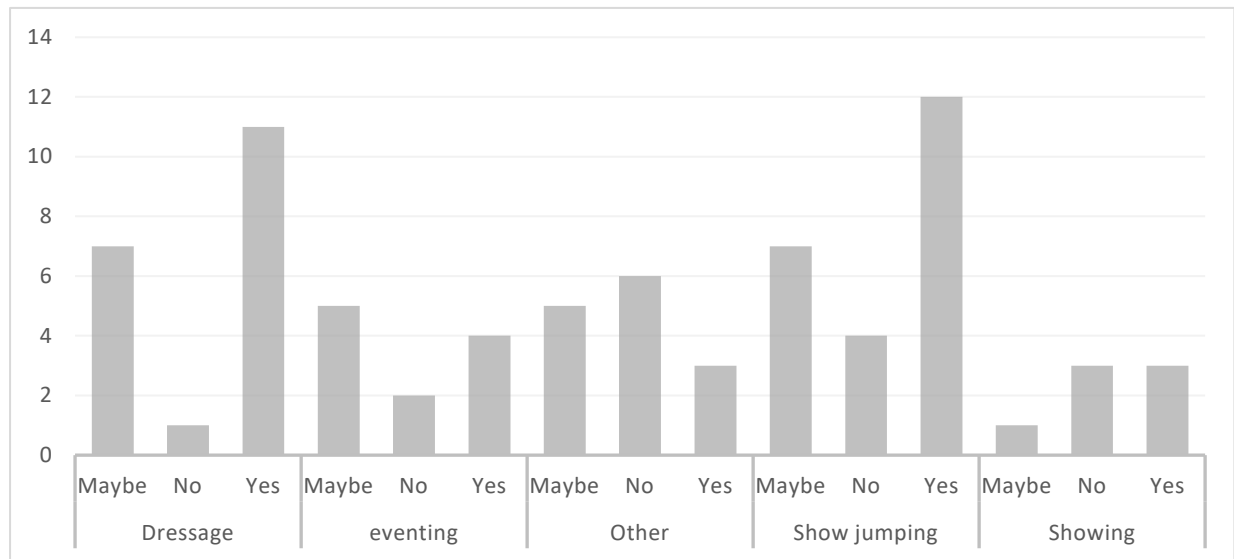


Figure 1: A figure to show the relationship between discipline a rider participates in and their perception of whether negative body image is an issue.

Discussion & Conclusions: The results identified additional influential factors, in addition to discipline participating in, upon body image perceptions. Factors such as body size, judgement of others weight and diet as well as emotional impact all contributed towards their perceived perception of body image. It was identified that those that rode in subjectively judged disciplines such as dressage and showing had an increased negative perception upon body image. Suggesting that riders in which their aesthetics and appearance are under direct scrutiny and are an integral part of the scoring system as they directly influence scores (Stachurska and Bartyzel, 2011). Therefore, having an increased negative perception on their own body image. Negative body image was still identified in disciplines judged objectively, but mainly only showjumping. Suggesting that there is a limited impact that the method of judging has on body image perceptions. However, in objectively judged disciplines there is a stereotype of a rider in these disciplines being slim and toned in order to maximise the horses' performance. Therefore, potentially increasing negative perceptions of body image.

It was found that perceptions of other riders and judges have a large impact on a riders' mental wellbeing as well as their perceptions of body image, due to pressure to conform to a perceived stereotype. Larger riders were thought to be judged more negatively due to body size and reported a higher amount of comments regarding body size and shape from coaches and judges. Weight and diet were highly influential on muscle strength and can impair athletic performance as well as increase levels of body satisfaction. The relationship between body image in female equestrians and competitive discipline warrants further investigation to ensure appropriate safeguarding for participants in equestrianism in future.

Undergraduate Poster Presentations

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Undergraduate Poster Presentations

The Effects of Tristan Tucker's TRT Method on the *Equus Caballus* Stress Responses

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Introduction: Further research is required within the equine industry to assess the effects of natural horsemanship training methods, such as the TRT Method developed by Tristan Tucker. Stress-related conditions can be identified when it is not possible for the horse to cope successfully (Stauffacher, 1992). Natural Horsemanship methods use training methods that produce a horse which responds to stimulus control originating from the handler, rather than responding primarily to environmental stimuli (Goodwin, *et.al*, 2009). Tristan Tucker states "train horses with a higher natural instinct of survival, we need to recognise that we have to give the horses more knowledge on how to respond" (Mathieson, 2015). The results of this study determined the efficacy of the TRT Method in reducing stress reactions within training and understand the impact of natural horsemanship techniques on equine wellbeing. The findings of the study may be of interest to industry professionals and owners to improve welfare.

Materials & Methods: Stress responses were assessed before and after the horses participated in TRT groundwork patterns, using a heart rate monitor and a behavioural ethogram, when presented to a novel object. The study included horses (n=15) from a private livery yard of varying height, age and breed.

Horses were walked on a 20-metre circle until the heart rate was in a normal resting range (36-42 beats per minute), before the study began to allow for habituation to the heart-rate monitor. Horses wore a Polar H10 Heart Rate monitor and handlers wore a Polar M340 wristwatch. Behaviour was assessed using a behavioural ethogram. Horses were walked up to an open umbrella and exposed to it for a minute whilst the stress responses were recorded. If the heart rate reached over 90bpm the exercise was stopped. All handling was carried out by the owner of the horse for each stage, and they wore correct PPE (riding hat, gloves, sturdy boots). The experimental test area was a 40m x 25m floodlit arena. The horses were then taught a simple TRT groundwork pattern, which was repeated with the addition of a new novel object.

The groundwork pattern involved flexing the horse's neck to the left, then encouraging the horse to cross its right (offside) front leg behind its left (nearside) front leg. The heart rate monitor and Minitab™ software was used for data analysis, using the Anova test to compare results, a normality test to assess residual values, and a Tukey Comparison Test to group information and find the confidence percentage. A Descriptive Statistics found the mean and medium of the heart-rate results. An Anova General Linear Model, a Probability Plot test and a Tukey Comparison test were also undertaken. An ethogram was undertaken to record behaviours.

Undergraduate Poster Presentations

Table 1. Horse Participant Information

Horse	Age (years)	Breed	Sex	Additional Information
1	11	Irish Sports Horse	Gelding	N/A
2	27	Thoroughbred x Dales x Fell	Gelding	Was taught Monty Roberts Intelligent Horsemanship as a young horse but hasn't done any training sessions in years
3	7	Connemara	Gelding	N/A
4	9	Welsh Section D	Gelding	Owner reported unpredictable behaviour when out hacking and some handling issues
5	16	British Spotted Cob	Mare	N/A
6	12	Connermara Cross	Mare	Previously evented
7	21 Months	Traditional Cob	Gelding	Has previously done some natural horsemanship groundwork
8	7	Traditional Cob	Mare	Competes in TREC nationally
9	15	Irish Draft x Connemara	Gelding	N/A
10	11	Thoroughbred	Gelding	N/A
11	16	Welsh Cross	Mare	N/A
12	10	Irish Cob	Mare	N/A
13	10	Arabian	Gelding	Has previously done groundwork training
14	6	Welsh Section A	Mare	Owner reports horse having trust issues with handling, horse was unhandled until 3 years old
15	8	Thoroughbred	Mare	Owner reports horse having trust issues with handling, has done natural horsemanship training methods previously

Results: The heart rates were significantly lower after the TRT Method ($F=88.26$, $DF=1$, $p<0.001$). The residual values also conformed to normal distribution ($AD=0.392$, $P=>0.05$). The number of horses displaying stress responsive behaviours was also lower after participating in the TRT Method when presented to a novel object.

Undergraduate Poster Presentations

Discussion & Conclusions: Although this study found the heart rates were significantly lower and a reduction in stress-indicative behaviour, future research needs to investigate the effects of the TRT Method on behaviour and heart rate over a prolonged period to assist with advancement in learning theory applied training, which can then be applied to equine management practices and improve welfare.

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Undergraduate Poster Presentations

An investigation into owners' perceptions of colic surgery

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WINNER of the prize for
the best undergraduate
poster presentation

Keywords: Colic, Surgery, Owner perception

Introduction: Colic describes any gastrointestinal pain in a horse, and despite being the leading cause for premature death in many populations of horses (Archer and Proudman, 2006), it has limited known cures. Colic surgery is becoming more commonly available around the world, however there is a lack of research surrounding the reasons why an owner would choose for their horse to have it. The aim of this study was to gain an understanding into horse owner's current opinions of colic surgery, and which factors would influence their decision when it comes to choosing surgery. It was hypothesised that both past experience of colic and the frequency of colic symptoms displayed would affect the owner's decision.

Materials & Methods: A cross-sectional questionnaire of open and closed questions was used, followed by chi-squared tests and deductive content analysis. Themes and codes for content analysis were constructed based upon pre-existing research surrounding colic surgery.

The questionnaire was distributed on social media and completed by a total of 102 participants.

Table 1: The themes and codes used to analyse qualitative data from the questionnaire, via deductive content analysis.

Theme	Codes
Owner's relationship with their own horse	Length of time owning horse
	Amount of experience with horse
	Relationship the horse
Previous experience with colic	No previous surgery
	Previous surgery
	Positive experience
	Negative experience
Existing knowledge of colic surgery	Cost and insurance
	Knowledge given from veterinarians e.g., prognosis
	Knowledge from past experience
Quality of life	Before surgery e.g., previous use
	Operation complications
	Quality of life after surgery
	Age of the horse

Undergraduate Poster Presentations

Results: Most participants (23.5%) were found to have between 11- and 20-years' experience with horses. There was no significant relationship ($p \leq 0.05$) between previously being a primary caregiver for a colic case, length of time owning a horse, or primary relationship with the horse and choice for surgery. The only symptom found to have a significant effect on the decision was lip curling ($p = 0.05$).

Discussion & Conclusions: The most mentioned code was knowledge from veterinarians. Participants displayed good levels of trust in their vets when describing how they would never go against veterinary advice. Conversely, others suggested feeling pressured into agreeing to the surgery by their veterinary surgeon. A vet-owner relationship is vital in emergency situations; however it is the job of the veterinary surgeon to advise, not to pressure an owner into agreeing to something (Scantlebury *et al.*, 2014). No previous experience with colic was the second most discussed code. This may be due to owner's finding it morally reassuring to know they did everything they could by choosing surgery, even if they have had no experience of it previously (Averay *et al.*, 2022). Cost and insurance were also discussed throughout. This was not unexpected; veterinary care decisions are often greatly influenced by economic responsibilities. Based on these findings, it is suggested that further investigation is needed to identify where gaps in owner knowledge exists, in order to supplement learning surrounding colic surgery. There should also be more research surrounding how the frequency and number of colic symptoms effects an owner's choice for surgery, as this may give a greater insight into how owners choose to have surgery or not.

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Undergraduate Poster Presentations

Analysis of the progressive motility of extended frozen-thawed sperm for the use of equine artificial insemination.

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Keywords: Progressive motility, Equine artificial insemination, Semen

Introduction: Cryopreservation of equine semen is one of the leading technologies enabling artificial insemination. Despite the myriad of research regarding frozen thawed semen use in the equine industry, a significant gap is prevalent regarding the use of extenders and frozen thawed semen. This has the potential to extend the progressive motility of sperm, potentially leading to better fertility results. Other benefits of extender use in chilled semen include expanding the suitable equine candidates for artificial insemination. Chilled samples also require less technicality when inseminating; providing another reason to further investigate the addition of extenders to chilled semen.

Materials & Methods: Data were acquired from 63 ejaculates from stallions (n= 63, age 3-23 year). Once frozen and thawed by standard operating procedures, Computer Assisted Semen Analysis (CASA) was used to assess the progressive motility (%) of the sample. INRA-96 extender was used at 50 million sperm/ml of semen. Progressive motility was then recorded at four intervals; immediately post thaw and 12, 24 and 48 hours after (still thawed and not refrozen). Despite the focus of this study regarding progressive motility, concentration and viability were also analysed using the NucleocounterSP-100 TM (Hernandez-Aviles and Love, 2021). All data were uploaded to Stallion AI New technologies (SAINT), creating stallion profiles that were able to be transferred to an Excel spreadsheet. Once all data were collected, Minitab 21 was used to produce a set of non-parametric Wilcoxon signed-rank tests to find the median values of progressive motility. These could then be compared to the required value of 35%.

Results: Significant differences were found between the first three intervals. (W=2016.00, P=0.000, F=0.000). The progressive motility (PM) of sperm throughout the entire trial is presented in figure one.

The mean PM of the initial post thaw sample was 46.17%, which then decreased to 40.68% 12 hours after thawing; 36.37% at the 12-hour interval and finally 25.84% 48 hours post thaw. These findings are significant as the necessary PM value for semen samples to be viable for artificial insemination is 35%.

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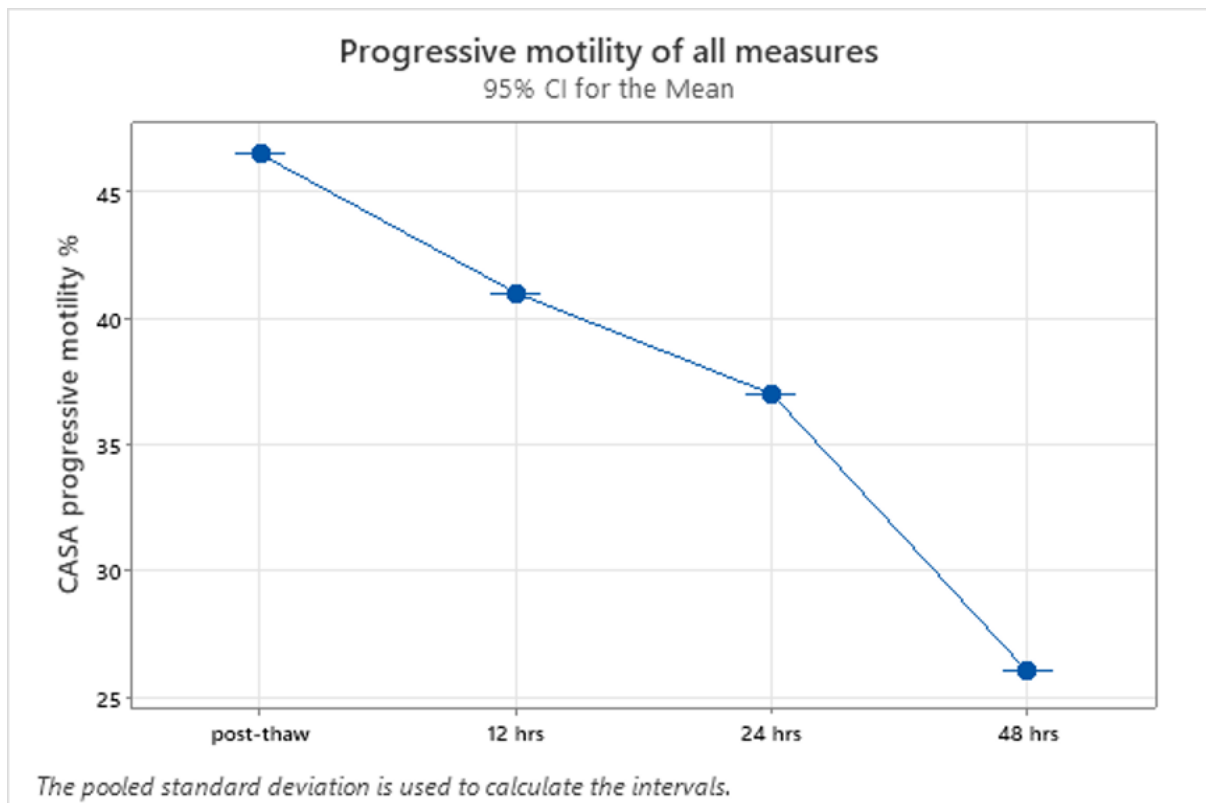


Figure 1: Progressive Motility Decline of 12-, 24- and 48-hours Post Thaw.

Discussion & Conclusions: Data indicate the possibility of this method being used in the artificial insemination industry, following further research. Literature shows progressive motility at 48 hours post thaw being 4.5% higher (Prell *et al.*, (2020) than findings presented here. As INRA96 extender was used in both studies, the only difference was the temperature the semen was stored at. Thus, as well as pregnancy trials, further research could include investigation into minuscule temperature changes. Both parameters will reveal the ability and efficacy of frozen thawed sperm to successfully fertilise mares.

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Undergraduate Poster Presentations

Investigating Functional Movement Screen Test Scores in Mounted Games Riders

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Keywords: Functional movement screen, Mounted games

Introduction: The Functional Movement Screen (FMS™) helps to assess basic functional movement, identify asymmetries or compensatory movement patterns and ascertain injury risk. FMS™ in riders has previously identified low scores and asymmetrical movement patterns that may have an effect on rider performance, as seen in the paper by Lewis *et al.*, (2019a & b). Mounted games is a fast-moving equestrian sport that requires athleticism, accuracy, and agility, yet, to date there has been no published research evaluating Functional Movement in Mounted Games riders. Therefore, the aim of this research is to determine FMS™ scores for Mounted Games riders.

Material & Methods: Thirty-four riders (mean age 20.3 +/- 3.53 years old), ten MG and twenty-four non-MG riders volunteered to participate in this study, non-MG riders were any horse riders who did not partake in MG. There were only four males and thirty females. The FMS™ consists of 7 screening tests (deep squat, hurdle step, in-line lunge, shoulder mobility, active straight leg raise, trunk stability push-up, and rotary stability) with the highest score after three repetitions being recorded, by the same scorer for all participants. In addition, three clearing tests were performed (shoulder impingement, spinal extension, and spinal flexion), to see if pain was provoked. The total sum of all 7 movements was calculated, with a maximum FMS™ score of 21 and was analysed using the Mann-Whitney U test with $P \leq 0.05$.

Results: Results indicated a significant difference ($p < 0.05$) in the total FMS™ scores between MG and non-MG riders ($p = 0.021$) with a mean score of 15.6 (+/- 3.24) for the MG group and 13.04 (+/- 3.11) for the non-MG, with the non-MG group having a mean score of 14 or less it means they are at an increased risk of injury (Cook *et al.*, 2014b); scores in-line or below the red line on figure 1 are ≤ 14 . The odds ratio (0.32:1 MG:Non-MG) showed that non-MG riders were 3.125 times more likely to be at an increased risk of injury.

Table 1: FMS™ Movement Patterns with Statistical Significance

FMS™ Movement	P-Value
Rotary Stability <i>total</i>	P = <0.001
Rotary Stability <i>left</i>	P = <0.001
Rotary Stability <i>right</i>	P = <0.001
Shoulder Mobility <i>total</i>	P = 0.010
Shoulder Mobility <i>left</i>	P = 0.020
In-Line Lunge <i>right leg</i>	P = 0.037
Hurdle Step <i>total</i>	P = 0.007
Hurdle Step <i>left</i>	P = 0.042
Hurdle Step <i>right</i>	P = 0.026

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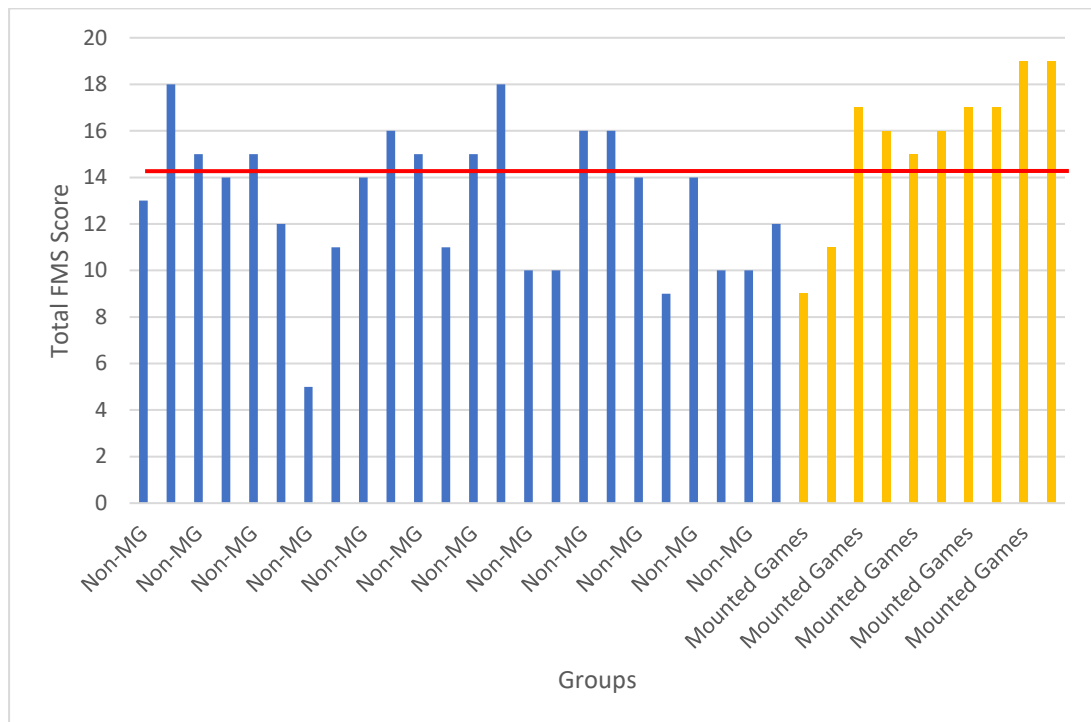


Figure 1: Total Value of FMS™ Scores between Mounted Games and Non-MG riders

Discussion & Conclusion: With 4 out of the 7 movements showing some form of significant differences (table 1), whether that was left, right or total; this suggests that the symmetry in both groups is slightly low. Asymmetry has a possible impact on rider performance, as it limits their ability to apply the correct aids to the horse. This suggests the FMS™ could be a useful analytical tool; however, further research is needed into this area, with a larger sample size and more even groups, to gain a better understanding of the discipline and the levels of intensity that MG riders put their bodies through compared to non-MG riders.

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Undergraduate Poster Presentations

Dual force sensor system exploration of the Dutch gag bit on the ridden horse.

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Keywords: Poll, Pressure, Dutch gag, Bit

Introduction: Riders perceive the Dutch gag as a severe type of bit due to the leverage action of the bit which is perceived to apply an increase in pressure to the poll; however, researchers have contradicting views of the Dutch Gag's severity. Lack of quantitative data related to pressure applied by tack could be seen as a welfare issue (Luke *et al.*, 2023). In addition, there is risk of horses performing dangerous behaviours due to overloading of pressure which could cause injury to both horse and rider. The aim of this study was to measure the amount of poll pressure which is applied by a Dutch Gag bit in ridden horses. The objective is to use the TeleRein tension meters to collect data on the poll pressure applied by the Dutch gag on the different rings in ridden work.

Materials & Methods: Six horses aged 14-20 years old, Cob types in medium work were ridden on a 24-meter straight line in walk, trot and canter by a level 6 equitation rider. The horses were all ridden on the right rein and data was only collected down the straight 24-meter line with a 15-minute warmup period in all three paces to habituate the horses to the bit on both reins, horse speed was not calculated, and data were only analysed from the left rein. Telerein tension meter data was calculated on Microsoft Excel. The horses were worked on the 24-meter line in each pace three times on each different setting of the bit in three different sessions (the three lower rings). The test took a maximum of twenty-two minutes. The rings were named in a descending order with the top ring being R1 the middle ring R2 and the third ring R3.

Results: A Shapiro-Wilk test was carried out to analyse the raw data for normality ($W(54) = .965, p = .112$). The significance level was kept at $p < 0.05$. A two-way factorial ANOVA on Microsoft Excel identified a statistically significant difference between severity levels of the Dutch Gag Bit ($P < 0.0001$). A Paired T-test showed that the statistical significance was from severity levels R1-R2 ($p < 0.030$) and $p < 0.060$) and severity levels R1-R3 ($p < 0.001$ and $p < 0.003$), however there was no significant difference in severity levels R2-R3 ($p < 0.062$).

Discussion: The ANOVA tests and paired t-tests showed statistically significant increases in severity of pressure applied at the poll of the ridden horse as the rings go down the shank. However, the significances were found between R1 to R2 and R1 to R3, this shows that there is no significant increase between R2 to R3. This suggests that the third ring may be obsolete as it does not change the pressure applied to the horse in a significant way, and that R2 may be more severe than earlier due to it having a similar amount of pressure as R3. It needs to be taken into consideration that this study did only focus on poll pressure and the rings may have a more significant effect on other pressure points that this bit affects. The data collected within this dissertation challenges the assumption that the Dutch Gag bit increases poll pressure applied to the rings on the bit on the

Undergraduate Poster Presentations

ridden horse as the pressure only increase on the first two rings which is contradicts previous assumptions that all three rings increase poll pressure.



Figure 1- An image of the TeleRein tension meter attached to one of the sample horses on severity level R3

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Undergraduate Poster Presentations

The prevalence of diagonal dissociation and its influence on dressage scores in competition horses when comparing collected and extended trot.

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Keywords: Dressage, Horse, Diagonal-dissociation, Performance

Introduction: Hind-first diagonal dissociation (DD) is proposed as a desirable trait in dressage horses but its occurrence and effect on competition score are poorly understood. Previous research is dated and has focused on small samples (<33) of high-level competitors (Deuel & Park, 1990). Therefore, this project aimed to identify the prevalence of diagonal dissociation and its influence on dressage score in collected (CT) and extended trot (ET) during Prix St. George (PSG) and Grand Prix (GP) dressage competition, which was open to all competitors at that level, to allow for comparison between classes and for assessment in a more accessible real-life population.

Materials & Methods: Forty-nine horses were recruited (GP n=18; PSG n= 31). High-speed-videography (240Hz) recorded CT (X-C) and ET (H-X-F) during PSG and GP. Hoof impact and lift off were visually determined and analysed for right forelimb/left hindlimb (RFLH) and left forelimb/right hindlimb (LFRH) for three strides per horse. DD presence and direction (hind-first, fore-first, neutral) were calculated. Wilcoxon signed Rank tests compared CT and ET for each limb pair and between LFRH/RFLH pairs, as data were non-parametric. Mann Whitney U tests compared PSG to GP ($p \leq 0.05$) and depending on normality of the data, Pearson's and Spearman's correlations related DD to overall score and individual movement mark separately.

Results: Dissociation patterns were seen in 99.3% of horses. Hind-first DD was most common in both classes at 95.4% (PSG=95.9%, GP=94.4%). Neutral contact and fore-first DD were seen in the GP and in ET only (Neutral=1.9%; Fore-first=3.7%). In the PSG, 15 strides had fore-first DD (collection=6, extension=9). Occurrence of diagonal dissociation for PSG and GP is displayed in Table 1. CT had a significantly larger DD in the GP for both diagonal limb pairs ($p=0.007$, $p<0.001$) but only for RFLH in PSG ($p<0.001$). PSG compared to GP had an increased DD for LFRH ($p=0.036$), but no other significant differences were seen ($p>0.05$). Differences between limb pairs were found in the PSG only, with longer RFLH DD in CT ($p=0.007$) but larger LFRH DD in ET ($p<0.001$). No significant correlations were observed between DD and overall score or individual mark ($p>0.05$).

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Table 1: Occurrence of diagonal dissociation as frame numbers and DD for PSG and GP.

	GP CT LFRH	GP CT RFLH	GP ET LFRH	GP ET RFLH	PSG CT LFRH	PSG CT RFLH	PSG ET LFRH	PSG ET RFLH
Max frames (f/s)	46	27	31	18	24	30	22	18
Min frames (f/s)	1	2	-12	-4	-3	-5	-1	-8
Mean frames (f/s)	12.57	12.78	8.81	8.74	10.51	12.04	10.15	8.02
Std.dev	±8.29	±5.62	±7.88	±5.28	±4.68	±6.17	±5.16	±4.69
Median frames (f/s)	11.5	12	9	10	11	12	10	8
Range frames (f/s)	45	25	43	22	27	35	23	26
Max DD (sec)	0.184	0.108	0.124	0.072	0.096	0.12	0.088	0.072
Min DD (sec)	0.004	0.008	-0.048	-0.016	-0.012	-0.02	-0.004	-0.032
Mean DD	0.050	0.051	0.035	0.035	0.042	0.048	0.041	0.032
Std.dev	±0.03	±0.02	±0.03	±0.02	±0.02	±0.02	±0.02	±0.02
Median DD (sec)	0.046	0.048	0.036	0.04	0.044	0.048	0.041	0.032
Range DD (sec)	0.18	0.1	0.172	0.088	0.108	0.14	0.092	0.104
Key: GP = Grand Prix, PSG = Prix St.George, CT = collected trot, ET = extended trot, LFRH = left fore – right hind diagonal pair, RFLH = right fore – left hind diagonal pair, f/s = frames per second, Std.dev = standard deviation								

Discussion & Conclusion: Positive DD is highly prevalent in advanced dressage horses and allows for the reduction of mechanical energy losses during locomotion and may indicate improved balance, posture and stability, as required by top level dressage horses (Hobbs et al., 2016). However, there was no association of DD and judges scores, suggesting its high prevalence might reduce the impact on performance outcomes. Further investigation is necessary to establish if diagonal dissociation increases the horse's potential to reach top-level competition, or whether its frequent occurrence is a development of training.

Acknowledgements: Thank you to the FEI for consenting to this project.

Undergraduate Poster Presentations

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Undergraduate Poster Presentations

An insight into equine grooms: injury prevalence and subsequent actions

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Keywords: Equestrian, Industry, Employees, Workplace safety

Introduction: Working in the equine industry is widely known to be a dangerous job. Injury prevalence has previously been investigated in veterinarians, riders and racing jockeys (O'Connor et al., 2018). However, there is very little research on the occurrence and severity of injury in working grooms. Recent studies have focused on stable staff in the racing industry (Davies et al., 2022). However, racing staff are required to have a written contract, be registered and receive benefits. In comparison, many non-thoroughbred grooms working in other disciplines work under less regulations from governing bodies, even though efforts have been made by the British Grooms Association (BGA) to improve this situation. Identifying the prevalence, severity and reasons for injury in grooms may enable an insight into how common injury is, how it affects their working life and if grooms tend to take subsequent action.

Materials & Methods: Following institutional ethical approval a questionnaire was distributed to a wide demographic of UK equine grooms using convenience sampling through social media (e.g., Facebook groups). Participants were over 18 years old and working or have worked as equine grooms for any discipline at some point during their career. Prior to release, the survey was piloted on 10 participants and necessary changes were made. The questionnaire was available from the 14.02.2023-01.03.2023 and received 153 responses. The data collected were non-parametric and included ordinal and nominal variables. Descriptive statistics were used, and a thematic analysis (Braun & Clarke 2006) was conducted to analyse the data.

Results: Most injuries occur through direct work with the horse (76.96%). The most common injury was bruising (39.87%), but muscle strain, tendon/ligament damage and lower back pain also occurred frequently and to the same extent (22.22%). Injuries showed a tendency to become chronic (55.55%). Subsequently, 56.21% of respondents sought medical attention on the same day. However, 27.45% of respondents did not receive any. Many participants (43.79%) did not make any adaptations to their working life post injury and either took less than (17.65%) a week or 2-4 months (13.73%) off work. Thematic analysis identified three main themes related to injury discomfort, response to injury, and the profession (figure 1).

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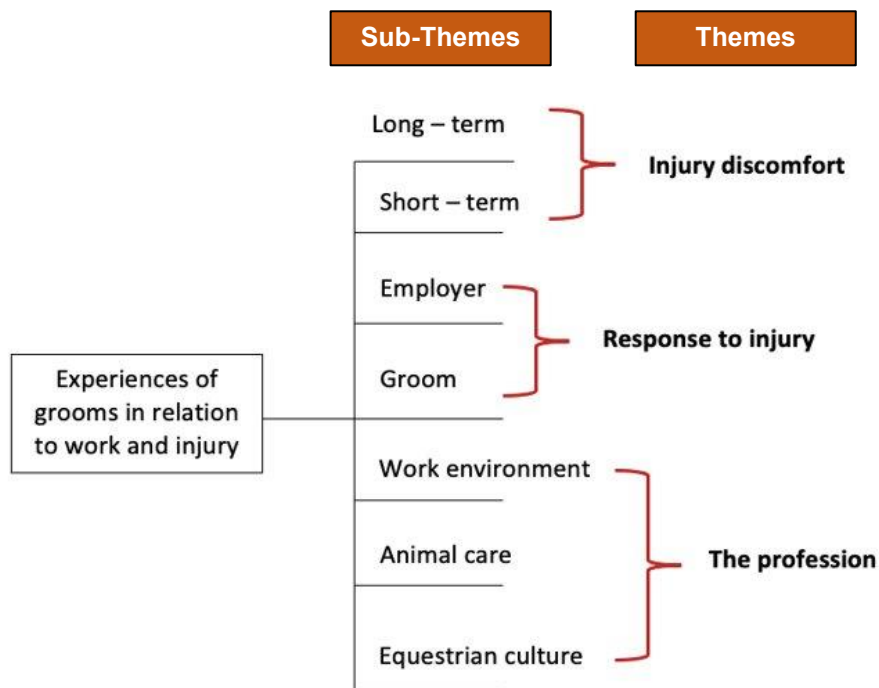


Figure 1: Thematic analysis diagram identifying themes and sub-themes.

Discussion & Conclusion: The high prevalence of injury in equine grooms has identified the horse as a major occupational hazard. However, both employers and grooms themselves seem to be partly responsible for not taking appropriate subsequent action. A gap in knowledge on employment and related injury prevalence was identified and requires further investigation on a greater scale. Recommendations for injury reports and prevention, as well as employment guidelines should be made to the governing bodies in alignment with previous efforts made by the BGA and the Equine Employers Association. Subsequently, further investigation into injury management and return to work would also be warranted.

Acknowledgements: Many thanks to Emma Davies for allowing us to base our questionnaire on her work.

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Undergraduate Poster Presentations

Does test design in the Individual Grand Prix Freestyle, at the World Equestrian Games, impact the score?

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Keywords: Performance analysis, Equine sport, Dressage, Tactics

Introduction: Dressage is one of three Olympic equestrian sports in which horse and rider combinations perform a predetermined test of movements in an arena that is judged in line with a set framework. The Grand Prix Freestyle (GPF) sits within the highest level of Dressage and is a test choreographed to music. Technical and artistic marks for each movement in the test are awarded out of 10 by a judging panel. Understanding factors that can influence scoring could be advantageous to competitors, however performance analysis (PA) research in Dressage is limited. This study aimed to establish if relationships existed between test design and judge scores to demonstrate if PA was an effective tool for performance enhancement in elite level Dressage.

Materials & Methods: Notational analysis (NA) was used to identify whether the order and location of technical movements in the GPF at the World Equestrian Games (WEG) (2022) impacted judges scores. Publicly available video footage was reviewed and the sequence (order) and location (quarter – Figure 1) of technical movements (excluding entry halt) required in the GPF were collated by a consistent observer. A series of Pearson and Spearman Rho tests established if relationships existed between order of movement and technical, artistic and overall movement scores. A Kruskal-Wallis test established if differences existed between which quarter the movements were performed in and the frequency of movement, and between the quarter and overall score, overall technical score and overall artistic score. Significance was set at $p < 0.05$ and all analyses were conducted using SPSS version 29.

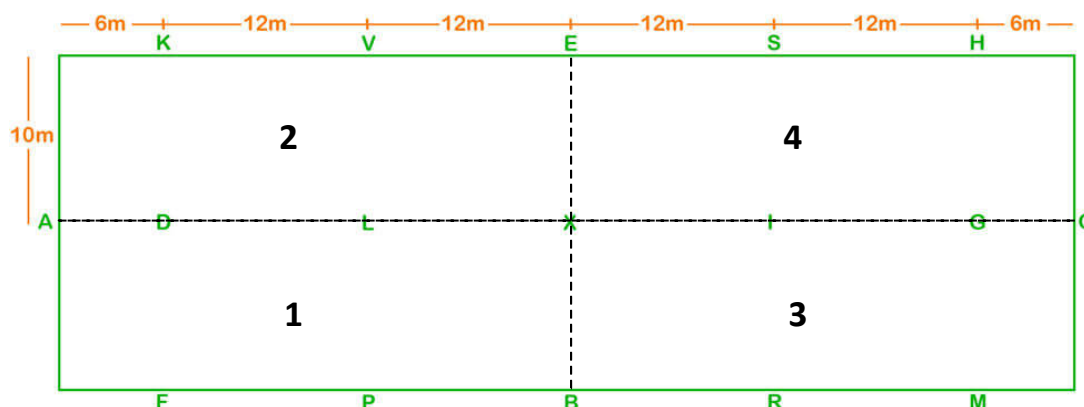


Figure 1: 20 x 60 m Dressage arena, displaying every marker and each quarter which was used for data collection (Equine World UK, n.d.).

Undergraduate Poster Presentations

Results: The order and location of technical movements had no effect on judges scoring in this class, with the exception of movement 14: piaffe ($p=0.001$). Combinations who performed piaffe in quarter four scored significantly higher in their technical (TS) and artistic (AS) scores for the movement (TS: 78.1 ± 2.7 ; AS: 90.2 ± 3.6) than competitors performing piaffe in quarters one to three (TS Q1: 76.0 ± 2.8 ; $p=0.003$; Q2: 77.2 ± 3.3 ; $p=0.066$; Q3: 77.0 ± 1.0 ; $p=0.040$; AS Q1: 86.2 ± 4.0 ; $p=0.001$; Q2: 88.1 ± 5.1 ; $p=0.016$; Q3: 86.4 ± 2.6 ; $p=0.004$). Interestingly, gaits anecdotally considered to underpin superior dressage performance such as walk, did not differ across competitors, suggesting all horses were of a consistent standard at this level of competition as would be expected.

Discussion & Conclusions: These results suggest PA is a useful tool to inform test design tactics and aid performance enhancement at elite level Dressage competition. Based on the results, elite level combinations should focus on the quality of piaffe and consider the location that technical movements are performed during the test to enhance their competition scores. Further investigation into location of movements, position of judge and monitoring individual horse and rider combinations across multiple competitions to showcase specific performance, may be beneficial to strengthen the use of PA as a tool to improve performance. In addition, qualitative research could be useful to give an added perspective and inform the reasoning behind riders and judges performance decisions.

Undergraduate Poster Presentations

Observing Conflict Behaviours Whilst Lunging in Training Aids that Promote Open and Closed Head and Neck Angles: A Pilot Study

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Keywords: Lunging, Conflict behaviours, Head and neck angles, Training aids

Introduction: Lunging is routinely used as a way of exercising horses from the ground, and training aids are commonly used to create an outline or to ask the horse to work harder. Up to 82% of respondents have reported to use training aids whilst lunging. There is currently a lack of research surrounding lunging and conflict behaviours in general, and research is conflicting when looking at riding in training aids which promote a closed head and neck angle. The aim of this study was to observe conflict behaviours horses expressed when lunging with training aids promoting an open head and neck position (chambon) and a closed head and neck position (rubber bungee).

Material & Methods: Four horses were lunged on an eighteen-meter circle for five minutes. The lunging procedure was one-minute walking followed by two and a half minutes of trotting on both the left and right rein. This lunging procedure was repeated three times. Once for the chambon, once for the rubber bungee and once for a control lunge wearing just the lunging roller. All horses wore their own bridle, boots, and a high withered saddle pad. A random number processor was used to dictate which training aid was used in which order. The study was recorded, and conflict behaviours were noted using an ethogram (table 1). The data were extracted using MiniTab 21©, and significance was determined using a series of one-way ANOVAs.

Table 1 : Ethogram adapted from Mullard et al. (2017) and Dyson et al. (2018)

<u>Behaviour</u>	<u>Description</u>
Mouth Gaping	Opening of the horse's mouth
Tongue sticking out	Tongue visible
Chewing the bit	Visibly chewing the bit
Head shaking	Tossing up or down
Spinning	Turning >150 degrees
Behind the vertical	Behind the vertical for >5 strides
Breaking gait	Unexpected change in gait
Unwilling to go forward	More than one forward cue needed
Bucking or kicking out	One or more hindlimb above the ground
Turning head	Turning the head to the inside or outside

Results: When horses were wearing the rubber bungee the results showed a significant increase in chewing the bit ($F=4.50$, $d.f.=2$, $P=0.044$) and working behind the vertical ($F=13.36$, $d.f.=1$, $P=0.011$) when compared with the control group of no training aid however, this was not seen when comparing the control group to the horses wearing a chambon.

Undergraduate Poster Presentations

Discussion & Conclusion: The significant difference in conflict behaviours when wearing the rubber bungee could be due to the heightened complexity in working with a closed head and neck position as increased difficulty under saddle has been linked to a rise in conflict behaviours however further research would be needed to support this. The difference in conflict behaviours could also be due to this specific training aid's slow pressure release. Comparisons could be made to a cross-under bitless bridle, which has been theorised to have a slow pressure release and is linked to an increase in certain conflict behaviours (Scofield and Randle, 2013). These findings could help give owners and trainers more understanding of the influence these training aids have on their horses' behaviours. Further studies with a broader range of horses and training aids may support these results.

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Undergraduate Poster Presentations

Angular conformational analysis of forelimb and hindlimb in event horses in relation to performance

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Keywords: Angles, CCE, Eventing

Introduction: Static conformation has been used to evaluate potential performance, especially in dressage and Show jumping (SJ). 'Sloping shoulders' are preferable for dressage horses as it can improve balance (Back and Clayton, 2013). With conformation linking to longevity, it is an important aspect to consider when developing the equine athlete (Ducro *et al.*, 2009). With eventing made up of dressage, SJ and cross country, the relationship between conformation and performance needs to be explored to help improve understanding of this demanding sport. Investigation into preference of joint angle should be conducted to see if the event horse has a difference between performance level and, if eventing has preference of joint angles between the difference phases within it. Reasoning for performing the study is that there is limited research on joint angles in relation to performance level of event horses, and the known research is outdated. Aims: To compare Forelimb (FL) and Hindlimb (HL) joint angles against different British eventing performance levels.

Material & Methods: Thirty-seven sound event horses were recruited; all were competing at British eventing (BE) levels BE80 to 2-star. These included: 7 competing at BE80, 9 at BE90, 9 at BE100, 8 at BENOVICE and 4 at BENOVICE+. Photographs were taken of the horses from the lateral perspective. Using image J, markers were positioned on specific bony landmarks (shown in figure 1) and angulations of the respective joints measured. The data was further analysed by one-way ANOVA (parametric data) or Kruskal Wallis (non-parametric data) to see if there were significant statistical differences in angular conformation between competition levels of event horses.

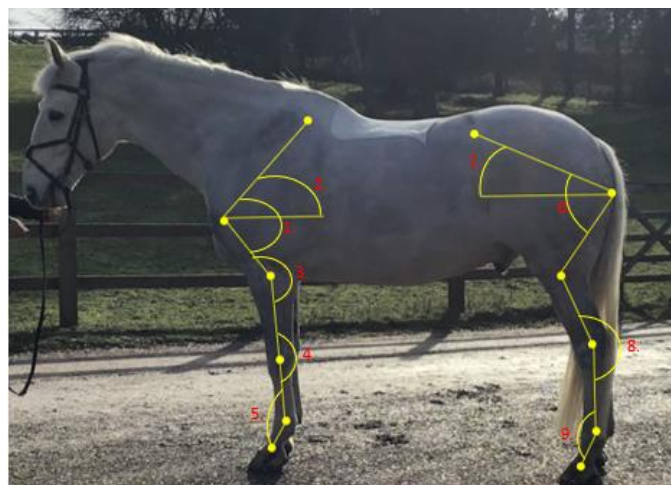


Figure 4: Yellow spots dictating the placements of markers to measure joint angles. The numbering of each joint angle corresponds to the joint angle measurements in order.

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Results: There were no statistically significant differences in the limbs joint angles in relation to performance level in BE sports horses ($p>0.05$) (Fig. 2 Shows shoulder angulation between different levels of BE performance level). The average eventing group did however have some angulation matching the elite dressage group in comparison to an unpublished study (Holmstrom, 1995, unpublished study) (Back and Clayton, 2013). Overall, conformational angulation had a similarity to dressage conformation type rather than SJ.

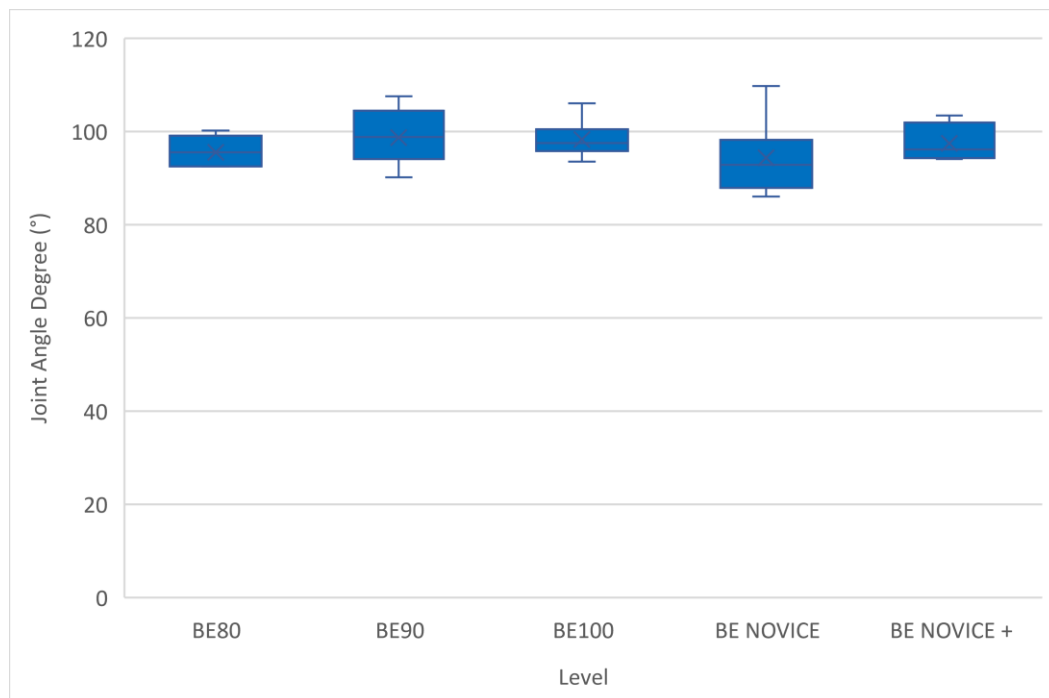


Figure 5: Shoulder Angle (SA) for the different eventing groups. BE80, BE90, BE100, BE NOVICE and BE NOVICE+. The bottom and top of the box are the first and third quartiles, the band inside the box is the second quartile (the median), and the 'x' is the mean. The lines extending vertically from the boxes (whiskers) indicate the minimum and maximum of all the data.

Discussion & Conclusion: The results from this study show that there is no correlation between conformation and performance level of event horses, this may be due to the small range in eventing levels or that the 'ideal' event horse has not yet been created. There are however links between the event horse's conformation and elite dressage horses, thus indicating that there is a preference for this type of joint conformation. There are a range of types of event horses, many other factors comprising the event horse may have more priority, and currently conformation is not of high relevance in the production and/or choosing of event horse. This does not mean that conformation should not be considered when picking an event horse as there are links between longevity and performance and conformation.

Undergraduate Poster Presentations

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Undergraduate Poster Presentations

An investigation into thermoregulation and cool down period of the horse

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Keywords: Equine thermoregulation, Homeostasis, Dissipation, Evaporation.

Introduction: Thermoregulation, the process of the body maintaining its core temperature, supports the maintaining a core temperature of 37-39°C (Simon et al., 2006). When athletic demand increases, homeostatic status can decrease and therefore thermoregulatory efficiency also decreases. In this instance, thermoregulatory mechanisms such as sweating and vasodilation are the primary methods for heat dissipation (McKeever et al., 2010). The process increases the horse's cardiac output (Conwell, Sojka, and Van der Kolk, 2012). It is common practice in the industry to cold sponge by way of removing excess heat through convection, alongside the application of sweat scraping; a tool used to remove excess water/sweat. The aim of this research was to investigate the effectiveness of sweat scraping compared to not sweat scraping as a cooling method post cold sponging, cooling the horse with cold water on a sponge.

Materials & Methods: Subjects (n=8) were recruited through convenience sampling from Sparsholt College Equine Centre and were randomly allocated into two groups (1) sweat scraped and (2) not sweat scraped. Prior to exercise, eye, body, and rectal temperatures were recorded using a thermal imaging camera (FLIR-E5) and a rectal, digital thermometer. Each subject was ridden for 40 minutes, consisting of 5 minutes of walk, 10 of trot, 10 of canter followed by 15 minutes of open order in trot and canter. Immediately post exercise, eye, body and rectal temperatures were taken. Subjects were cold sponged with 8L of water applied using the sponge until the water had run out. Temperatures were recorded every 2 minutes up to 10 minutes then again at 15 minutes. Data was recorded on a spread sheet after every temperature reading.

Results: There was no significant difference in body, eye and rectal temperature, between the two groups of horses ($P=0.800$) (1) sweat scraped and (2) not sweat scraped. Although not significant, temperature decreases of 3.8°C were seen in body temperature, 15 minutes after cold sponging in group 2. Rectal temperature after 15 minutes showed a temperature decrease of 0.125°C for horses in group 2 (37.450°C) compared to those in group 1 (37.57°C) with pre-work temperature recorded at 35.1°C.

Discussion & Conclusion: These findings support existing knowledge on cool down methods utilised within the industry, suggesting that convection is a more successful method compared to sweat scraping. In addition, there was a relationship between the decrease in eye and body temperature, supporting current understanding of the efficacy of thermoregulation in the horse. To increase the likelihood of reliability within the study, a larger sample size would benefit alongside a power calculation.

Undergraduate Poster Presentations

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Postgraduate

Poster Presentations

Effects of a Single Acupressure Treatment on the Nociception of the Equine Epaxial Musculature.

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Keywords: Horse, Pain, Alternative

Introduction: Equine musculoskeletal pathologies frequently present for veterinary or physiotherapy attention, and commonly result in reduced equine welfare (Clegg, 2011). Acupressure is an advantageous therapy for physiotherapists within the UK due to its less invasive nature, reduced risks, and lessened requirement for equipment (Jeune *et al.*, 2016), while allowing the therapist to remain within the remit of the Veterinary Surgeons Act 1966. There is an abundance of acclaimed anecdotal evidence for acupressure, however, scientific evidence is lacking to support its use. Therefore, the proposed study aimed to research the effect of manual acupressure on the mechanical nociceptive thresholds (MNTs) of the equine epaxial musculature.

Material & Methods: The study design was a randomised, single cross-over utilising 10 horses. Horses received either a 10-minute acupressure or sham treatment. Nine acupressure points were selected (GV20, Bai-Hui, GV3, and BL20, BL13, and BL15 bilaterally). Each point was treated with 30-seconds of direct pressure followed by 6 full circles. All acupressure treatments were administered by the same researcher, a Veterinary Physiotherapy student, trained by a qualified Veterinary Physiotherapist. In the sham group, the administer held their finger approximately 1-inch above the point during the time. MNTs were measured before, immediately after, and 1-day after. A Force Ten FDX 100 pressure algometer was used to measure MNT thresholds in Newtons (N) to two decimal places. Values were measured at three points bilaterally (T9, T18, L6). A 2-week washout period was implemented, the groups were reversed, and the protocol repeated. Data were both parametric and non-parametric, therefore, to ascertain if differences occurred in MNT values across the time points, a series of repeated measures ANOVAs and Friedman's analyses were undertaken. Where significant differences were found, post-hoc Wilcoxon with Bonferroni correction identified how MNTs differed with time. Further paired t-test or Wilcoxon rank tests determined if differences occurred in the percentage of improvement between the treatment and control group.

Results: At T18 (left), there was a statistically significant increase in MNTs immediately post-treatment in comparison to pre-treatment scores (-10.38 (95% CI, -18.35 to -2.41) N, $p = 0.01$). At T18 (right), there was also a statistically significant increase in the MNTs immediately post-treatment in comparison to pre-treatment scores (-12.39 (95% CI, -22.25 to -2.53)N, $p = 0.01$). The combined algometry points revealed a statistically significant difference between pre-treatment MNTs and immediately post-treatment ($p \leq 0.0001$), and between pre-treatment and one day post-treatment ($p = 0.000782$). No significance was determined at the other points ($p > 0.05$).

Postgraduate Poster Presentations

There was a statistically significant difference between the percentage of improvement between the treatment (Median(Mdn)=16.32%) and control group (Mdn=6.19%) at T18, $z = -2.128$, $p=0.03$. There was no significant difference between the percentage of improvement at the other points ($p>0.05$).

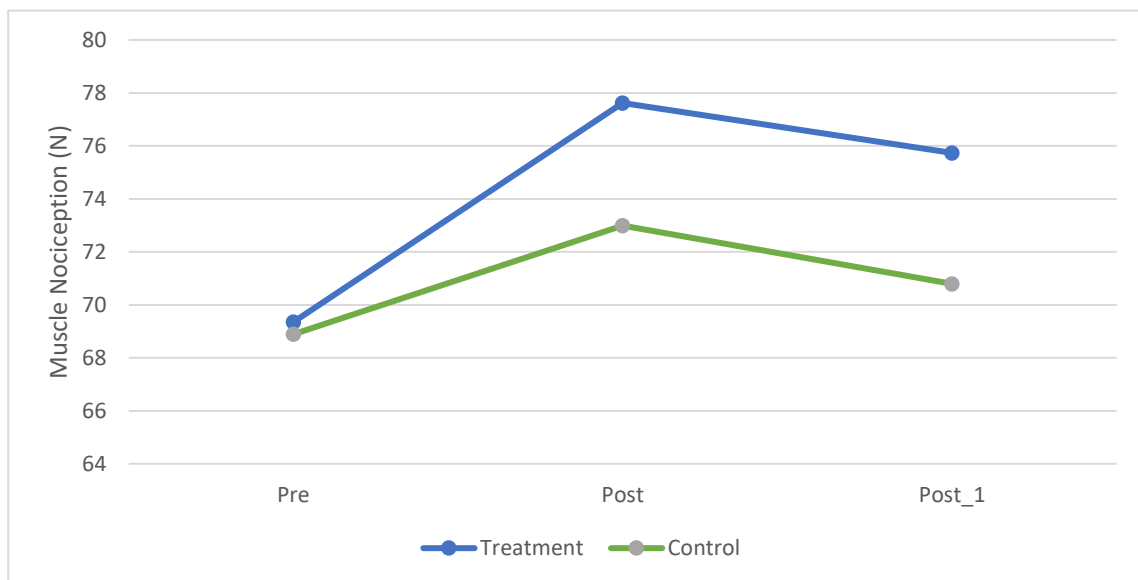


Figure 1: Linear graph displaying mean MNTs (in Newtons (N)) at pre, post, and post_1, for the treatment and control group of all combined algometry points. Illustrating the significant increase of MNTs in the treatment group pre and post treatment ($p < 0.0001$) and pre and post_1 treatment ($p = 0.000782$), and a significant increase in the control group pre and post treatment ($p=0.04$).

Discussion & Conclusions:

These results highlight an immediate increase in the MNTs in the thoracolumbar region following a single 10-minute treatment of acupuncture in comparison to a sham treatment. It provides preliminary evidence suggesting the use of acupuncture to decrease nociceptive response in horses, therefore decreasing pain, allowing a better back movement.

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Postgraduate Poster Presentations

How does the perimenopause/menopause affect rider participation and performance in dressage?

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WINNER of the prize for
the best postgraduate
poster presentation

Keywords: Menopause, Perimenopause, Dressage, Performance

Introduction: Perimenopause and menopause occur for women during the age ranges of 35-65. According to British Dressage 2022 membership data, 55.1 % of membership were females between the ages of 35-65. Symptoms of peri- and menopause can vary, and potentially impact rider ability. Performing well in dressage relies on a unique dyadic relationship between two sentient synchronous beings – the rider and the horse (Hogg & Hodgins, 2021). This study examined effects on participation and performance in dressage riders experiencing symptoms of the perimenopause/menopause. There is a paucity of specific literature focusing on the effect of the peri/menopause on female athletes, and none relating to female athletes in equestrian sport. A study undertaken on the perceived effects of the menopause among Masters Swimmers concluded this stage in life did impact swimmer performance and encouraged further research within other sports (Ussher et al., 2009). Given the average age of equestrian athletes at Rio 2016 Olympics was 44.1 years of age (Dumbell et al., 2018), and the BD membership data above, there is a strong rationale to support research in this area.

Material & Methods: Four experienced amateur dressage riders competing from Novice to Intermediare I were interviewed using semi-structured interviews, applying mostly open questions, with a carefully constructed introduction to create rapport and trust. Interviews were recorded and transcribed for thematic analysis. All participants were known to the researcher. Participant selection deliberately sought those who considered themselves to have reached menopause.

Reflexive Thematic Analysis was utilised in analysing the data, a method of qualitative data analysis developed by Virginia Braun, Victoria Clarke, and their colleagues. Symptoms reported were those they felt had the most profound effect on their participation and performance in the sport. Key themes were identified and recorded. The researcher was a female dressage rider within the age groups of those being interviewed. Reflexivity was therefore considered throughout the interviews and the analysis to ensure ongoing critical reflection and iteration.

Postgraduate

Poster Presentations

Results: Interviews took a minimum of 37 minutes with an average of 45 minutes. Most common themes across the four participants were – tiredness/exhaustion, unable to sleep, brain fog/memory loss, sudden anxiety or nerves, confidence loss and mood swings. Joint pain was a key theme. Most had considered giving up the sport due to confidence being eroded and anxiety related issues. Two of the riders were strongly and positively influenced by a female coach through their experience. All strongly supported the notion their participation and performance had been adversely affected by the symptoms they had each experienced.

Discussion & Conclusion: The results of this study suggest that participation and performance of the participants within this data set have been negatively impacted; the extent varying according to the individual experience. The results have potential implications for coaching, performance pathway programmes and general participation. British equestrian Lorna Johnstone competed at her 3rd Olympic Games in 1972 just a few days before her 70th birthday - female equestrian athletes can continue competing at the highest levels into advancing years. Equestrians would therefore be more impacted by this life stage than athletes in other sports. Further studies should be undertaken with a larger sample and across all three Olympic equestrian disciplines given the effect on participation and performance.

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Postgraduate Poster Presentations

Applying a Realist Approach to BHS Riding School Views on Social Licence to Operate

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Keywords: Equestrian, Social Licence, Riding Schools, Realist Evaluation

Introduction: Challenges to its Social Licence to Operate (SLO) is an emerging area of importance for equestrianism (Duncan *et al*, 2018). Riding schools are the gateway for people coming to equestrian for the first time. The project aims to consider the impacts of equestrian's SLO on British Horse Society (BHS) member riding schools. The research questions were:

1. What are the views of BHS riding school managers in England on equestrian's 'Social Licence to Operate'?
2. How useful is the realist evaluation methodological approach to progressing knowledge of riding schools' SLO?

It was hypothesised that riding school managers will hold views on equestrian's SLO relationship to their businesses.

Methodology: Four BHS approved riding school managers were interviewed with regards to their views on SLO. A realist evaluation methodology (Dalkin *et al*, 2015) was used to analyse the data with the view of developing initial programme theories. Transcripts were thematically analysed and reductively developed into CMO configurations (Dalkin *et al*, 2015).

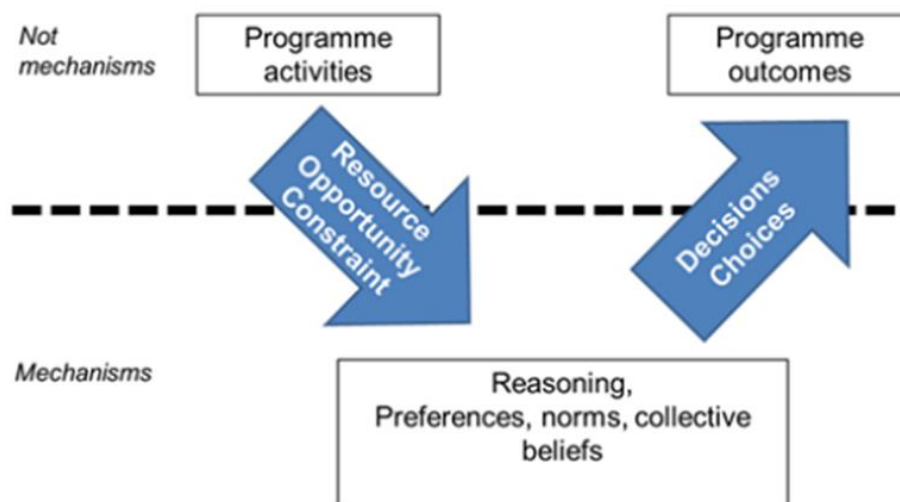


Figure 1: A pictorial representation of mechanisms (Wong *et al*, 2013, p5)

The riding schools remained anonymous due to the sensitive nature of the study. The research was approved by the Hartpury University's Ethics Committee.

Postgraduate

Poster Presentations

Results: Initial Programme Theories developed from the CMO Configurations included:

- Social media posts, positive or negative, have an impact on public perception of horse riding and affect participation.
- Adapting traditional terminology and practices that are poorly perceived positively improves the public perception of horse riding.
- Negative public perception of horse riding arises from elitism, poor welfare practices, perceptions of 'domination' of an animal, poor treatment of staff.
- Positive public perception of horse riding arises from activity that has low cost to the horse and high benefit to humans, promoting the partnership aspect of horse riding, and Great Britain's success at Olympic/ Paralympic level.
- Whilst everyone involved in equestrian has a role to play, governing bodies and those in the public eye have a heightened responsibility.
- Low understanding and engagement with SLO across riding schools may mean 'falling behind' public opinion on equestrian, with potentially negative outcomes for centres.
- Poor practices at one riding school can have negative implications for riding schools as a category, as participants do not necessarily differentiate between different businesses.

Discussion & Conclusions: A link between top level sport and riding school participation was suggested with participants noting influxes of new riders after Olympic and Paralympic successes. Whilst much of the academic research focuses on equine welfare with regards to SLO, participants brought up issues with elitism, lack of inclusivity, and the expense of the sport.

This pilot study suggests that a realist evaluation approach could be successfully applied to riding schools in relation to SLO impacts and used to progress knowledge of the challenges faced in this area. It is recommended that future research considers all aspects of equestrianism that could impact SLO, not just welfare.

Acknowledgements: I would like to thank the riding schools for their consent and participation.

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Postgraduate

Poster Presentations

The effect of Handedness and Footedness on Postural Asymmetries in Amateur Dressage Riders at Trot and Canter on a Simulator.

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Keywords: Rider posture, Laterality, Performance

Introduction: Dressage rider asymmetry is often observed at amateur level competition (Hawson *et al.*, 2014). Research has shown, rider asymmetry negatively impacts equine locomotion and performance, (MacKechnie-Guire *et al.*, 2020), possibly leading to equine injury, causing concerns for equine welfare. However, rider handedness and footedness has received little attention. Riders use both hands and legs for bilateral and unilateral tasks interchangeably, with reins and stirrups for support. Sport performance literature reports the non-dominant hand and foot adopts a stabilising role (Lin *et al.*, 2009), whereas dominant limbs are adapted for fine motor tasks. This study aimed to determine if a relationship between handedness, footedness, and postural asymmetry exists, in amateur dressage riders, at trot and canter on a simulator.

Materials & methods: Female dressage riders (n=20) were recruited and completed versions of the Edinburgh Handedness Inventory, and Waterloo Footedness Questionnaire. Laterality Index scores were calculated ($LI = [(R-L)/(R+L) \times 100]$ (R= right and L= left) and riders grouped. A small number of riders had mixed or left-hand dominance, grouped as non-right hand dominant (non-R) (n=5). The majority were right-hand dominant (n=15). Footedness groups were right footed (n=10), left footed (n=3) and mixed footed (n=7). Qualysis™ Track Manager gathered data about rider joint angles, and Ipos™ Rein Sensors measured rein tension (RT) whilst riders rode on a Racewood™ Event simulator for 30 seconds at trot and canter left and right. Riders rode in a dressage saddle and order of gaits were not randomised. Mean and range values were taken for dependent variables and symmetry values calculated for mean RT (average left RT- average right RT). Using Minitab20, a Generalised Linear Model, was applied and Alpha significance level was set at $P < 0.05$.

Results: Significant differences in gait, RT and joint angle in mean and range of motion (ROM) were found between groups. At trot non-R riders ($F_{Df} = 7.06_1$, $P = 0.01$) showed significant increase in ROM of the left hip, and left footed riders ($F_{Df} = 5.45_2$, $P < 0.05$) showed significant increase in the ROM of the left hip across all three gaits, most notable in trot and right canter (Figure 1).

Higher average left RT in 80% of riders, showed increased RT in the riders' non-dominant hand. Increasing gait significantly affected ROM in both hip and elbow joints ($F_{Df} = 44.11_2$, $P < 0.05$).

Postgraduate Poster Presentations

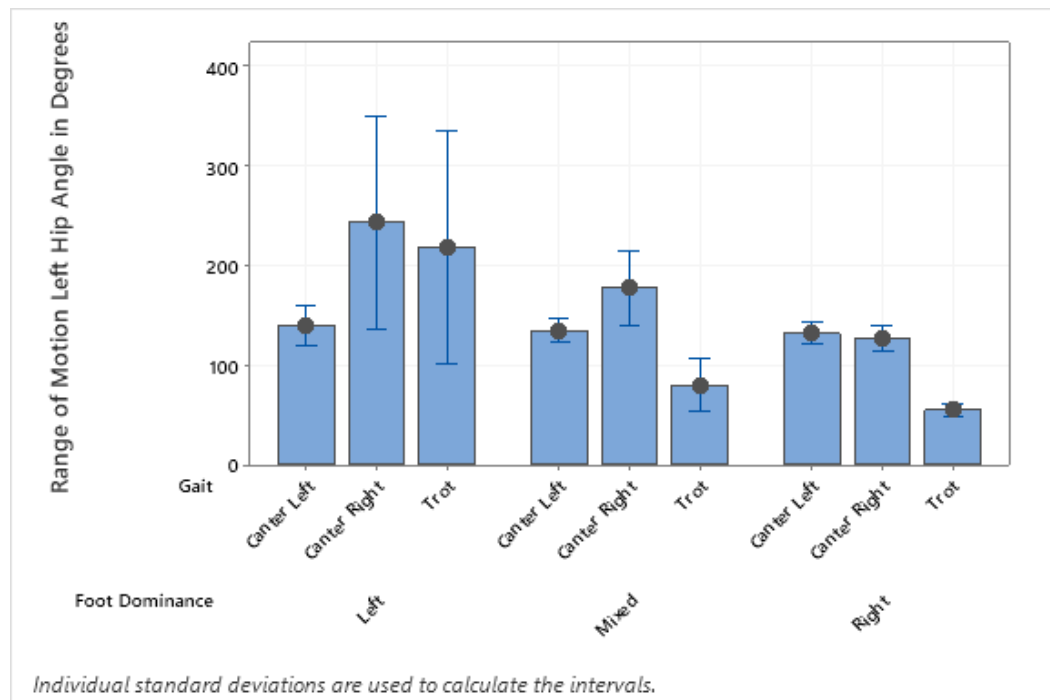


Figure 1. Interval plot showing range of motion in left hip, gait, and footedness groups.

Discussion & conclusions: There are evident differences between handedness and footedness groups affecting amateur dressage rider posture, specifically hip and elbow angles. As in previous research, the role of dominant limbs and non-dominant limbs should be considered, as symmetry in dressage rider performance is desired. Further research is required investigating handedness and footedness, with a balanced sample of left dominant riders, as the nature of dressage riding suggests variation in handedness and footedness between different tasks. This research may support the improvement of technical skill performance in amateur dressage riders, improving training protocols to better support riders in becoming straighter, and more balanced thus improving dressage performance and equine welfare.

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Postgraduate

Poster Presentations

Practical Stud Use in Show Jumping

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Keywords: Equine, Arena, Grip, Traction

Introduction: The aim of using studs is to maximise grip of the hoof upon surface contact to minimise slip and maximise performance. There is little understanding presently of the practical use of studs in equestrian sports. Studding decisions are made by stakeholders with little consultation of scientific knowledge due to a lack of literature to support such guidance. The current study aimed to explore trends in stud choice relating to stakeholder role, years active and level of competition and to investigate stud use in relation to stud shape, size and configuration across two different grass surfaces.

Materials & Methods: An online questionnaire (JISC Online Surveys, www.onlinesurveys.ac.uk), distributed via social media was used to gain information from industry stakeholders. Participants had to be over eighteen years of age and involved in show jumping within the previous 24 months. The questionnaire was divided into three sections: (1) general information relating to respondents' experience in the sport; (2) the process of stud choice and factors that influence this; and (3) how studs are used in relation to shape, size and configuration. Surface Condition One (SC1) was described as a good grass surface, that is active, supportive, not slippery and with high grip. Surface Condition Two (SC2) was described as a deep grass surface, that is dead, slippery, with little grip or support. Percentages were used to describe patterns in the data. Two-way Chi-squared tests were carried out to determine association between stud type and use, and surface condition, industry role, years active, and level of sport. Statistical analysis was conducted using R and R-studio software for initial data exploration (R-Studio Team, 2022) and Minitab was used for Chi-squared test of association (Minitab, LLC, 2021). Statistical significance was accepted at $P < 0.05$.

Results: Of 137 completed responses, 94% ($n=129$) of respondents stated 'Yes' to using studs when competing on grass surfaces. The rider was identified as the individual to most frequently select the studs used for competition (61%; 78/129). The most common number of studs to be used per shoe (front and hind) was two, accounting for 70% ($n=357$) of the total stud selection, with 99% ($n=352$) being placed at the heel. Conical-shaped studs were more likely to be selected for SC1 ($P < 0.05$) and cylindrical-shaped studs were more likely to be selected for SC2 ($P < 0.05$). Smaller studs (0-5mm/5-10mm) were more likely to be selected for SC1 ($P < 0.05$), with larger-sized studs (15-20mm/ ≥ 20 mm) more likely to be selected for SC2 ($P < 0.05$). Grooms were more likely to select larger studs compared to riders ($P < 0.05$). Amateur level participants were less confident about stud placement compared to other levels ($P < 0.05$).

Postgraduate

Poster Presentations

Discussion & Conclusions: Current studding practice in show jumping is described here and highlights how this may be influenced by surface condition, role, level within the sport and years active. Future research should explore use of studs in competitive settings against objective ground measurements to help to develop evidence-based guidance for equestrians.

Postgraduate

Poster Presentations

An investigation into ridden horse behaviour during the cross-country phase of a one-day event.

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Keywords: Eventing, Rider influence, Fence design, Performance analysis

Introduction: Identification of different types of ridden horse behaviours proves challenging. Several ridden horse behaviour studies have been completed across industry including show jumping (Górecka-Bruzda et al., 2015) and lameness evaluations (Dyson, 2017). However, there has been limited research investigating behaviour during the cross-country phase of eventing. Due to the intense physiological and psychological demands required of the event horse it remains empirical to establish behaviours seen throughout the cross-country phase to enhance ridden horse welfare. This novel study aimed to evaluate positive, conflict and fatigue behaviours during cross-country associated with the rider and fence design.

Materials & Methods: Pre-recorded videos ($n=53$) were observed from the 2* cross-country event at Bicton Horse Trials 2022. Each horse was individually observed, and notational analysis was used to identify positive, conflict and fatigue behaviours utilising an ethogram adapted from previous research. Horse behaviour and rider actions were assessed over four types of jumps; a standard single jump (SSJ), combination, water jump and drop fence. Chi-squared analyses investigated differences in the frequency of individual behaviours seen throughout the course. One-Way ANOVAs determined if differences in positive and conflict behaviours, and rider actions occurred by fence type, and between conflict behaviours and rider actions. Finally, a Pearson's correlation test determined if an association existed between the number of conflict and fatigue behaviours recorded.

Results: Ears forward or rotated, and normal head carriage were the most frequently observed positive behaviours across all fence types. Head raised was the most frequent conflict behaviour seen and sclera exposure the least frequent ($P<0.01$). Increased conflict behaviours were recorded at combination and drop fences, with mouth movement and head raised the most frequently observed at drop then combination fences compared to water and SSJ ($P<0.001$). The most frequent rider actions were voice encouragement and whip use at combinations and water jumps ($P<0.001$). Significant differences in conflict behaviours ($P=0.04$) and rider actions ($P=0.03$) were found by fence type; post-hoc analysis identified conflict behaviours occurred less at SSJ than combination fences ($P=0.04$) and rider actions were increased at combination jumps compared to SSJ ($P=0.03$) and drops (0.04). No correlations were observed between fatigue and ridden conflict behaviours.

Postgraduate

Poster Presentations

Discussion & Conclusions: Generally, more positive than negative behaviours were observed. The results suggest combination fences are associated with increased conflict behaviour and rider actions, suggesting the horse-rider partnership is challenged more at this type of obstacle than the others investigated. Why this is, warrants further investigation. Wider analysis of the fatigue behaviours at different stages of the course would also be beneficial to help safeguard event horse welfare.

Acknowledgements: We would like to thank Equireel for their support providing footage to facilitate this study.

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