

Hartpury Research and Knowledge Exchange Conference Programme 2024

Hartpury University

Published in:
Hartpury Research and Knowledge Exchange Conference Programme 2024

Publication date:
2024

The re-use license for this item is:
CC BY

This document version is the:
Publisher's PDF, also known as Version of record

[Find this output at Hartpury Pure](#)

Citation for published version (APA):
Hartpury University (2024). Hartpury Research and Knowledge Exchange Conference Programme 2024: Communication, Engagement and Impact. In *Hartpury Research and Knowledge Exchange Conference Programme 2024*



**HARTPURY RESEARCH AND KNOWLEDGE EXCHANGE
CONFERENCE PROGRAMME**

THURSDAY 11 JULY 2024



**Hartpury Research and Knowledge Exchange Conference 2024:
*Communication, Engagement and Impact***

Welcome from the Academic Dean (Research and Knowledge Exchange)

It is my pleasure to welcome staff, students, governors and guests to the annual Hartpury Research and Knowledge Exchange Conference. As ever the Conference comes at the end of a busy academic year and in an extremely volatile time for the university sector. It is particularly good to be able to come together and celebrate achievements in research and knowledge exchange. Knowledge creation and communication are at the heart of what makes a university, and it is important that Hartpury celebrates and communicates all that is positive about the work we do.

The Conference theme of 'Communication, Engagement and Impact' speaks to our aims of not only producing the highest quality research but sharing this knowledge to ensure real world relevance and impact. On this theme I am delighted to welcome two truly outstanding communicators as our keynote speakers. Jonnie Hughes is a multi-award-winning producer/director at the forefront of communicating impacts on our natural world. Most recently he was producer/director of the phenomenally successful David Attenborough: A Life on Our Planet, and co-author with Sir David of the accompanying book. Prof Martin Jones, as well as being a Visiting Professor at Hartpury, is a sport and exercise psychologist specialising in sleep, mindset training, and talent development. He has supported the performance of Olympians, elite athletes, coaches, performance directors, parents, corporate leaders, and specialist military personnel. A massive thank you to Jonnie and Martin for joining us today.

As last year, this conference will run in parallel with that of the Hartpury Sport Business Hub and we are pleased to welcome external guests that have engaged with our students in offering real world knowledge exchange projects. This is an outstanding example of teaching, research, knowledge exchange and industry engagement coming together to make a difference! We would also like to wish those students presenting the best of luck with their assessments and thank them for being such outstanding ambassadors for the University. Knowledge exchange is an important aspect of our work and mission at Hartpury and is particularly complementary to our applied and industry-relevant curriculum.

Our cohort of post-graduate students continues to drive forward cutting-edge research across all our disciplines. Hearing them present their work at the Conference is always a highlight that shows the breadth and quality of the research at Hartpury. We are excited again this year to hear more about their collective work as three-minute 'lightning talks'.

We are pleased to welcome guests from the University of the West of England (UWE) Bristol (our research degree provider), and we thank them for their continued support in a relationship that becomes stronger, and we find many areas in which to work collaboratively.

Next, particular thanks to the Hartpury Senior Management Team and governors for supporting us in our ongoing research journey. Finally, a massive thank you to our brilliant staff without whom none of this outstanding work would be possible.

I hope everyone has a fantastic day at the conference.

Prof Steve Draper
Prof Steve Draper
Academic Dean (RKE)

**Hartpury Research and Knowledge Exchange Conference 2024:
*Communication, Engagement and Impact***

Programme

09.00 to 09.30	Registration & Coffee	Mark Davidson Centre (MDC) Foyer
09.30 to 09:45	Welcome to the conference	Prof. Stephen Draper MDC1
09:45 to 10:45	Keynote: Planetary Stewardship – the next chapter in the human story	Jonnie Hughes MDC1
10:45 to 11.00	Networking and coffee break Poster Session	MDC Foyer
11.00 to 12.00	Spotlight Session 1. K Harris <i>Stories of Change: Documenting social change to promote physical activity in a deprived area</i> 2. R MacKechnie-Guire <i>Noseband Type and Tightness Level Affect Sub-Noseband Pressure on the Head at Trot</i> 3. J Williams <i>A move in the right direction: tracking the traceability of UK Thoroughbreds</i> 4. L Bearman Brown <i>Establishing a record-keeping system for wildlife rehabilitators</i> Hartpury Internal Grant Launch 2024/2025	Chair: Prof. Stephen Draper MDC 1
12:00 to 12:30	Postgraduate Research Student Presentations Three-minute Thesis	Chair: Prof. Stephen Draper MDC1
12:30 to 13:00	Celebrating Doctoral Completions 1. L Greening Applied quantification of equine sleep behaviour and environmental factors affecting its occurrence 2. V Walker Effect of exercise modalities on equine kinematics and their application to training and rehabilitation	Chair: Prof. Stephen Draper MDC1
13.00 to 14.00	Lunch Poster session	Hartpury House
14.00 to 15:00	Parallel Sessions	Details below
15:00 to 15:15	Networking and coffee break Poster session	MDC Foyer
15.15 to 16:15	Keynote: Research to Impact: Lessons Learned	Prof. Martin Jones MDC1
16:15 to 16:30	Presentation of awards and close of conference	Prof. Stephen Draper MDC1



Parallel Sessions (14.00 to 15:00)

		Themed Parallel Presentations	
14.00 to 15:00		<p>Performance</p> <p>1. K Nankervis</p> <p><i>The role of the equestrian professional in bridle and bit fit</i></p> <p>2. R Baby</p> <p><i>Identification of horse jump phases using inertial motion capture and video synchronisation</i></p> <p>3. A Hearn</p> <p><i>Criterion metric choice alters high-intensity phase demands.</i></p> <p>4. S Harniman</p> <p><i>A qualitative study of final year student veterinary nurses' career plans and expectations.</i></p> <p>Hartpury Internal Grant update</p> <p>5. C Szedlack</p> <p><i>The influence of dominant discourses on strength and conditioning coach education</i></p>	Chair: Kev Harris MDC 1
		<p>Environment</p> <p>1. S Udofia</p> <p><i>Assessing the interaction between grassland swards and soil</i></p> <p>2. N Powdrill-Wells</p> <p><i>Perceptions of pre-acquisition planning and expected care investment for companion animal species amongst animal welfare organisation staff and volunteers – A pilot study</i></p> <p>3. W Ng</p> <p><i>Differences in soil carbon among farmland types</i></p> <p>Hartpury Internal Grant update</p> <p>4. R Collins</p> <p><i>The equine carbon calculator: development of an industry tool</i></p> <p>5. I Schork</p> <p><i>Listening to nature: developing an ecoacoustic approach to farmland management</i></p>	Chair: Lisa Williams MDC 2



	<p>Welfare</p> <ol style="list-style-type: none">J Parker <i>Evaluation of a targeted behavioural sleep intervention for student-athletes</i>M Ahmad <i>Vision AI (Artificial Intelligence) for dairy cow behaviour monitoring: Enhancing animal welfare and management practices</i>A Adebayo <i>Evaluation of the drinking behaviour of housed dairy cows during the final period of pregnancy</i> <p>Hartpury Internal Grant update</p> <ol style="list-style-type: none">W McCormick <i>Establishing the use of bioelectrical impedance analysis for assessing body condition in domestic dogs (Canis lupus familiaris)</i>K Lesniak <i>A preliminary evaluation of the pattern of development of concurrent hoof and third metacarpal asymmetry in the developing Thoroughbred yearling</i>	<p>Chair: Lorna Cameron MDC 3</p>
--	---	---

Introducing our Keynote Speakers

Planetary Stewardship – the next chapter in the human story

Jonnie Hughes

Jonnie Hughes has produced and directed science and natural history films for the BBC, Discovery, National Geographic and Netflix. He was Supervising Producer attached to Netflix's Emmy award-winning *Our Planet* (2019) and producer/director on the multi-award winning *David Attenborough: A Life on Our Planet* (2020). In October 2020, Jonnie joined forces with Colin Butfield, previously an Executive Director at WWF, to create Studio Silverback, an arm of Silverback Films with a mission to use the power of filmmaking to take the story of the urgent need for sustainability on Earth to as big an audience as possible. Jonnie was Series Producer on their first series, *The Earthshot Prize: Repairing Our Planet* featuring Prince William and Sir David Attenborough for BBC and Discovery+. He co-produced Sir David's rousing address to 170 Heads of State in the Opening Ceremony of COP26. Jonnie has authored four books on science and the environment.



Introducing our Keynote Speakers

Research to Impact: Lessons learned

Professor Martin Jones

Martin Jones is a sport and exercise psychologist with more than 20 years of supporting athletes, coaches, performance directors and military personnel. Martin is an award-winning researcher and educator. Martin holds a visiting Professor role at the University of Exeter and is a visiting Professor at Hartpury University. He represented the UK MoD as the Defence Science and Technology Laboratory's Principal Advisor on Human Performance and Human Augmentation and represented the UK as the principal member of the NATO human factors and medicine research panel.



Spotlight Session: Abstracts

Stories of Change: Documenting Social Change to Promote Physical Activity in a Deprived Area

Christoph Szedlak^a, Kevin Harris^{*a}, Ryan, L.^b, Taylor H.^b, & Smith, M.^c

^a Hartpury University, Gloucester

^b Active Essex

^c Winchester University

christoph.szedlak@hartpury.ac.uk

Key words: narrative methods, documentary, participatory action research, realist informed thematic analysis

Introduction: As part of a participatory action research realist evaluation of Active Essex's implementation of Asset-Based Community Development (ABCD), the aim of this presentation is to show how narrative methods were used to develop a "Story of Change" of how the reclaiming of a notorious public park promoted physical activity within a deprived area.

Methods: First, through a series of realist informed workshops with 50 stakeholders, the reclaiming of a notorious public park was identified as a suitable story representing an effective ABCD approach. Second, 18 Stakeholders (i.e., primary school, police, council, park physical activity deliverers, and community members) took part in focus groups (n=2) or individual interviews (n=8). A reflexive thematic analysis informed by realist programme theories was performed.

Results: Themes essential to reclaiming the park to promote physical activity included: effective communication between stakeholders, developing relationships through trust (school), being present and approachable (police), and mobilising community members to lead (council). Framed around these themes creative analytical writing (CAP) techniques were used to develop a "Story of Change" documentary, which incorporated quotes that best represent the themes.

Discussion: Methodologically, our findings explored an innovative process of how CAP could be used within participatory action research to illuminate the process of social change to stakeholders, which is novel within current realist approaches. Our findings address recent calls to more effectively embed qualitative methods within co-produced research. Furthermore, our findings highlight how explanatory stories have the potential to impact on policy and practice development to promote physical activity.

Noseband Type and Tightness Level Affect Sub-Noseband Pressure on the Head at Trot

Russell MacKechnie-Guire, ^{a,b*}, Hilary Clayton^c, Jane Williams^a, Jane Nixon, Mark Fisher^e, Diana Fisher^e, Victoria Walker^a, Rachel Murray^f

^aHartpury University, Equestrian Performance Research Centre, Hartpury, Gloucester, ^bCentaur Biomechanics, Dunstaffnage House, Moreton Morrell, ^cDepartment of Large Animal Clinical Sciences, College of Veterinary Medicine, Michigan State University, ^dConsultant Buckingham Equine Vets, Overton Fields, Buckingham, ^eWoolcroft Equine Services, May Lane, Wisbech, ^fRossdales Veterinary Surgeons, Newmarket, Suffolk

Keywords: Welfare, bridle, Mandibular rami, nasal bones, pressure

Introduction: Bridle-hors interaction is complex and there is limited information about the relationship between the two, but poor adjustment could have welfare implications. To inform policy and rules and regulations, quantitative data is needed. The study objectives were to quantify sub-noseband pressures located dorsally over the nasal bone and ventrally over the mandibular rami for a Cavesson/Swedish-(crank)/Dropped/Flash noseband at five tightness levels (2.0 to 0.0 finger-equivalents) when horses were ridden in trot.

Material and Methods: Eight high-level horses were ridden at trot in a straight line by their usual riders. Two small force mats, attached to the noseband over the nasal bone and the mandibular rami, collected force/pressure data from four noseband types, each adjusted to five tightness levels (2.0, 1.5, 1.0, 0.5, 0.0 finger-equivalents) based on the use of a ISES taper gauge. Noseband tightness/types were compared using Friedmans analyses with post-hoc Wilcoxon tests ($p \leq 0.05$).

Results: Pressures (*median and [25th and 75th percentile]*) and forces increased with tightness for all noseband types with higher pressures consistently recorded on the mandibles (kPa) (Cavesson: 9.1 [5.0, 12.5], Swedish: 10.5 [6.3, 14.9], Flash: 8.0 [3.6, 15.2]) than the nasal bones. (Cavesson: 2.8 [1.1, 4.7], Swedish: 4.3 [3.1, 7.4], Flash: 4.9 [3.0, 7.3], $P < 0.002$). None of the measured pressures or forces differed significantly between tightness levels of 2.0 finger-equivalents (1.6 [0.6, 3.6] kPa) and 1.5 finger-equivalents (2.9 [1.3, 4.1] kPa), but these values significantly increased from 1.0 finger-equivalent (3.1 [1.5, 4.9] kPa), 0.5 finger-equivalents (4.2 [2.3, 6.2] kPa), and 0.0 finger-equivalent tightness (6.4 [3.8, 10.3] kPa) for most variables $P \leq 0.004$). No differences were found in mean or maximal nasal and mandibular pressures when fitted with Cavesson or Swedish nosebands.

Discussion: Nasal and mandibular pressures increased with noseband tightness, with 0.0-1.0 finger-equivalent associated with significantly and incrementally higher pressures than 1.5 or two finger-equivalents tightness. At individual noseband tightnesses, no differences were found between Cavesson and Swedish nosebands.

A Move in the Right Direction: Tracking the Traceability of UK Thoroughbreds

Jane Williams*^a, Jordan, S.^a, Friend, L.^a, Kay, E.^a, Edmund, M.^a, Flynn, H.^b and Wensley, S.^b

^aHartpury University, Gloucester, UK. GL19 3BE

^bHorse Welfare Board, London, UK

jane.williams@hartpury.ac.uk

Keywords: Horse racing; equine traceability; equine welfare; former racehorse.

Introduction: Horse racing is subject to public scrutiny questioning if Thoroughbreds have a good life. The Horse Welfare Board's "A life well lived" strategy advocates accurate lifetime traceability of Thoroughbreds is essential to achieve this. The Thoroughbred Census aimed to establish a current population density model for UK resident Thoroughbreds, not actively engaged in racing.

Materials and Methods: UK equestrians who owned or kept a Thoroughbred were asked to complete the Census between May and December 2023. Frequency analysis identified patterns in passport compliance, knowledge and understanding of current systems, and profiled Thoroughbred demographics: age, use, and history.

Results: Records for 8,256 horses were analyzed (margin of error: $\pm 1\%$, 99% CI). Most horses were owned (91%), geldings (74%), aged between 5-14 years (63%); 98% of horses had a passport, but only 64% were in their current owner's name despite 90% of respondents being aware that they should be. Leisure riding, hacking, and unaffiliated competition were the most common activities participated in; no significant differences in registration compliance occurred between activities.

Discussion: The Census provides an accurate representation of UK Thoroughbreds not actively involved in racing: 33,600 horses, with 80% currently traceable, and identifies areas where research and education initiatives can promote improved traceability and enhance Thoroughbred welfare.

Acknowledgments: We would like to extend our thanks to all respondents and stakeholder organisations who participated in the Census, and particularly Weatherby's, Retraining of Racehorses and World Horse Welfare for their support and engagement with the study, and Racing Foundation for funding this work. We would also like to thank and acknowledge the support of Great British Racing, in particular Gabi Whitfield, and the team at PerformanceCommunications.com for coordinating the media campaign for the Thoroughbred Census project.

Establishing a Record-Keeping System for Wildlife Rehabilitators

Lucy Bearman-Brown*^a, Favier, R.^a Rasmussen, S.L.^{b,c,d}

^aHartpury University, Gloucestershire, GL19 3BE, UK

^bWildlife Conservation Research Unit, Department of Zoology, The Recanati-Kaplan Centre, University of Oxford, Tubney House, Abingdon Road, Tubney, Abingdon, OX13 5QL, UK

^cDepartment of Chemistry and Bioscience, Aalborg University, Fredrik Bajers Vej, 7H, 9220, Aalborg, Denmark

^dDepartment of Biology, Section for Ecology and Evolution, University of Copenhagen, Universitetsparken 15, Building 12, 2100, Copenhagen Ø, Denmark

Lucy.Bearman-Brown@hartpury.ac.uk

Keywords: Hedgehog rehabilitation; wildlife rehabilitation; database

Introduction: Record-keeping is identified as a challenging area within wildlife rehabilitation (WR), particularly as it is an unregulated industry in the UK. This is particularly noted in the rehabilitation of hedgehogs (*Erinaceus europaeus*) as rehabilitation centres are frequently small, independent and run by volunteers or individuals working alone at their home address. This has an impact on day-to-day practice and also prevents research which could be undertaken in this developing field. Further, this may put veterinary practices in a position where they are unable to meet the rehabilitation requirements of animals, with lack of information evident. A significant number of rehabilitators rely on paper-based record keeping, and in fact some maintain little to no records at all regarding the animals they care for, despite administering medications, caring for animals for extended periods of time, or caring for large numbers of animals. The number of animals experiencing rehabilitation on an annual basis is unclear due to a lack of centralised record-keeping, although is believed to be potentially millions of animals globally; with more than 40,000 hedgehogs alone cared for in one year in the UK (potentially 8-10% of the national population). This project seeks to address these challenges by creating a user-friendly, accessible database that encourages record-keeping, particularly in the context of hedgehog rehabilitation, and facilitates positive impacts such as more informed veterinary care and improved data-driven research.

Materials & Methods: The aim is to undertake a survey of rehabilitators operating across the range of the species (mainland Europe and the UK) to establish current record-keeping practices in detail, then establish, test and launch a record-keeping system to support day-to-day record-keeping and research. Opportunities to test a prototype version of the system were provided at the International Conference for Hedgehog Rehabilitators.

Results: Feedback regarding the prototype of the system has been very positive, with significant indication that the system was required, effective and appropriate. Further development is currently in progress, with a particular focus on making it as accessible as possible, particularly considering technological experience of rehabilitators.

Discussion: The intention is that the system will be publicly launched by the Autumn, with further development of an app to work offline, and availability in a range of European languages to support data collection across the species range, alongside data for other species. Further funding is currently being sought to continue its development for both hedgehogs and other species of native wildlife.

Celebrating Doctoral Completions

Applied Quantification of Equine Sleep Behaviour and Environmental Factors Affecting its Occurrence

Linda Greening

Hartpury University, Gloucester, GL19 3BE

Linda.Greening@hartpury.ac.uk

Key words: sleep quality, sleep quantity, equine welfare, thesis

Introduction: Historically, equine sleep has been under-researched which has contributed to a lack of knowledge about how horses sleep, the impacts of poor sleep, and the inter-relationship between sleep and welfare/performance. Conducting research is difficult due to a number of factors including the complications associated with behavioural observations, and the lack of access to perceived gold standard measurements, for example electroencephalography. My research set out to raise the profile of equine sleep, using behavioural measurements, to investigate how the environment could be used to promote sleep. These publications resulted in the completion of a doctor of philosophy qualification (DPhil).

Material & methods: The DPhil qualification requires submission of a critical commentary, which took just under a year to write. My commentary aimed to showcase what is currently known about equine sleep and the factors which influence it within the domestic environment, whilst recognising limitations in existing knowledge, with reference to my research. Four of my published studies were deductive, involving observational one-shot (Greening et al. 2013), quasi-experimental (Hartman and Greening, 2019) or repeated-measure cross-over designs (Greening et al. 2021; Greening et al., 2023). Meanwhile the literature review (Greening and McBride, 2022) was written in collaboration with my external supervisor over a four-year period. The final study was accepted for publication just at the point of submission, such that the research contributing to the critical commentary spanned a total of ten years.

Results: The literature review provides a broad oversight of equine sleep research highlighting variation in the approaches taken to measure sleep by different authors. The review also offers novel ways to measure sleep in the future including a sleep quality metric. Experimental studies helped to confirm that the environment can be manipulated to significantly change horse sleep profiles, enabling recommendations for managing horses around bedding-depth and lighting within the stable. Results also showed how consideration should be given to the influence of the nocturnal sound environment.

Discussion: Recommendations around reliability and validity became apparent for future research. For example, sleep (behaviour) recordings should be conducted over a 24-hr period on multiple days, to provide a representative average behavioural profile for each individual in the sample population. Power calculations are recommended to evaluate and justify the sample size and the effect size should be considered where large variation within small cohorts is observed. To overcome limitations of convenience sampling, studies could be replicated at multiple sites with agreed standardised routine/husbandry. All confounding factors must be carefully considered, for example, the light intensity and exposure should be clearly stated, the season and relative temperatures, and bedding depth should be included. The most crucial next steps to revolutionise the field of animal sleep research must now involve creating a system that is both accurate (combining EEG and behavioural data) and efficient. On average, hour-long behavioural videos take between 10 and 20 minutes to analyse, which when you have 1500hrs of footage is a lot of time before you even get to statistically manipulating the data.

Acknowledgements: I am forever grateful for the guidance and support provided by my Director of Studies, Professor Jane Williams, and my external supervisors, Dr Sebastian McBride and Dr Marc Pierard.

References:

- Greening, L. and McBride, S, D. (2022) 'A review of equine sleep; implications for equine welfare.' *Frontiers in Veterinary Science: Animal Behaviour & Welfare*. 9, p.916737, doi: 10.3389/fvets.2022.916737.
- Greening, L., Shenton, V; Wilcockson, K; Swanson, J. (2013) 'Investigating duration of nocturnal ingestive and sleep behaviours of horses bedded on straw versus shavings.' *Journal of Veterinary Behaviour; clinical applications and research*. 8 (2), pp. 82-86, <https://doi.org/10.1016/j.jveb.2012.05.003>.
- Hartman, N. & Greening, L. (2019) 'A preliminary study investigating the influence of auditory stimulation on the occurrence of nocturnal equine sleep related behaviour in stabled horses.' *Journal of Equine Veterinary Science*. 82, p.102782 <https://doi.org/10.1016/j.jevs.2019.07.003>
- Greening, L., Downing, J, T., Amiouny, D., Lekang, L. & McBride, S. (2021) 'The Effect of Altering Routine Husbandry Factors on Sleep Duration and Memory Consolidation in the Horse.' *Applied Animal Behaviour Science*. 236, p.105229 <https://doi.org/10.1016/j.applanim.2021.105229>
- Greening, L. Allen, S. and McBride, S, D. (2023) 'Towards an objective measurement of sleep quality in non-human animals; using the horse as a model species for the creation of sleep quality indices.' *Biology Open*. 12(7)

Effect of Exercise Modalities on Equine Kinematics and their Application to Training and Rehabilitation

Vicki Walker, MacKechnie-Guire, R., Nankervis, K., Parker, J., Tabor, G.
Hartpury University, Gloucester, GL19 3BE, UK

Victoria.Walker@hartpury.ac.uk

Keywords: Pessoa Training Aid, polework, water treadmill, horse,

Introduction: During training and rehabilitation, exercises are frequently conducted with the aim of influencing the locomotor pattern of the horse. Various modalities such as training aids, polework, dry and water treadmills are commonly employed for this purpose; however, there is limited evidence of their effect on equine kinematics. The aim of this body of work was to investigate the effect of a Pessoa Training Aid, walking over poles, and walking in a water treadmill on equine trunk and limb kinematics. The accompanying thesis provided a critical commentary of this process.

Materials and Methods: Equine participants were acclimatised to the use of the modalities as part of inclusion criteria and had a lameness grade of $\leq 1/5$ on the AAEP scale. A combination of high-speed videography (125/240 Hz), optical motion capture (240 Hz), limb and upper body inertial measurement units (104/60 Hz) was used to quantify limb and trunk kinematics in four experiments: 1. Lunging at trot with and without a Pessoa Training Aid, 2. Walking over ground and raised poles 3. Walking in a water treadmill from dry to 47cm depth water 4. Post water treadmill exercise.

Results: Compared with a baseline of no intervention, the modalities induced kinematic changes. The application of the Pessoa Training Aid resulted in a decrease in speed, stride length, lumbosacral angle at maximum hindlimb retraction and subjective evaluation identified an increase in dorsoventral displacement of the mid back, and in grade of 'overall way of going' based on British Dressage scoring.

Walking over poles increased fore and hind limb range of motion, via increased swing phase flexion, compared to overground walking. This effect increased from ground poles to raised poles and only raised poles increased shoulder range of motion (ROM). Upper body kinematics indicated that the horse may use its head to balance over raised poles, as observed by increased craniocaudal ROM of the head and that mediolateral trunk motion increased over raised poles. Limb and flexion-extension ROM of the thoracic spine increased with water depth, whilst walking in water. Increased mediolateral ROM of the pelvis was observed with increased water depth, coinciding with peak hock flexion. This has some similarities with the findings over poles and together these findings suggest that increased mediolateral pelvic ROM may be a strategy to facilitate limb elevation, this is indicated for further work. Post water walking horses had a decrease in hindlimb fetlock extension at midstance and an increase in subjectively assessed hock oscillation.

Discussion: The study outcomes and the critical commentary can support decision -making to determine if the application of a given modality is warranted for a specific individual in relation to its training and/or rehabilitation goals. The studies suggest that pole work and water treadmill exercise are useful for increasing limb range of motion, but the action of the treadmill belt and the induction of increased limb retraction may influence the suitability of one over the other depending on the needs of the horse. Caution should be applied when extrapolating the findings determined in non-lame horses to horses undergoing rehabilitation.

Acknowledgements:

The authors of the published studies would like to thank the PetPlan Charitable Trust, British Dressage, Christian Landolt and Dr. Wilfrid Bechtolsheimer for funding.

Parallel Sessions: Performance

The Role of the Equestrian Professional in Bridle and Bit Fit

MacKechnie-Guire, R.^a, Williams, J.M.^a, Fisher, D.^b and Kathryn Nankervis,^{a*}

^a Hartpury University, Gloucester, GL19 3BE, UK.

^b Woolcroft Equine Services, Wisbech, UK.

[*Kathryn.nankervis@hartpury.ac.uk](mailto:Kathryn.nankervis@hartpury.ac.uk)

Keywords: Saddle fitter, musculoskeletal therapist, coach, qualification

Introduction: Bridle and bit fit are widely acknowledged to be equally important as saddle fit to the comfort of the ridden horse. However, there are far fewer qualified bridle and bit fitters compared to saddle fitters. Horse owners come into contact with a variety of equestrian professionals e.g., coaches, musculoskeletal therapists and fitters, who all have a role in safeguarding horse welfare, but have different degrees of responsibility and training with regard to bridle and bit fit. Better understanding of the nature of the interactions between these professionals and horse owners will identify opportunities to better support horse owners in achieving optimal bridle and bit fit for their horses. The aim of this study was to learn more about the frequency and nature of observations of bridle and bit fit made by professionals and the type of issues they see most often.

Materials and Methods: Participants completed an online questionnaire which was split into three sections: (1) participant demographics, (2) bridle fit and (3) bit fit for the horse with 30 question elements (14 multiple choice, 6 ranking and 9 open text elements) forming 25 main questions. The survey link was shared via industry regulatory bodies, national press and social media. Descriptive statistics and Kruskal Wallis analyses with post-hoc tests ($p \geq 0.05$) identified differences in responses between professions. Inductive content analysis identified themes from open-question responses.

Results: A total of 483 responses were obtained from within and outside of the UK. From the UK there were 377 respondents: 184 fitters, 116 coaches and 77 therapists. Coaches were more likely to ask clients when they last had their bridle fitted than fitters ($p=0.002$). Fitters were more likely to assess bridle fit statically and dynamically compared with coaches ($p=0.02$). 'Browband too small' featured in the top three bridle fit issues for all professions. The most frequent bit fit issues seen by fitters, coaches and therapists respectively were 'bit too big', 'bit not suitable for horse' and 'bit not suitable for horse-rider combination'.

Discussion: Despite differences in professional roles and responsibilities, fitters, coaches and musculoskeletal therapists often make similar observations regarding bridle fit. Where differences occur in bridle and bit fit observations, these can be explained by differences in professional capacities and the circumstances in which they are made. The findings of the study highlight areas of focus for education of professionals and horse owners alike in bridle and bit fit matters.

Acknowledgements: We would like to thank the Worshipful Company of Saddlers for funding this work, the Society of Master Saddlers Research Committee (represented by Diana Fisher) for assistance with study conception and design, and the Society of Master Saddlers membership for assistance with data collection.

Identification of Horse Jump Phases using Inertial Motion Capture and Video Synchronisation.

Raf Baby^{*a}, Wilkins, C.^b, Protheroe, L. ^a, MacKechnie-Guire, R. ^a, Nankervis, K. ^a

^aHartpury University, Hartpury House, Hartpury, Gloucestershire, GL19 3BE.

^bMaple Leaf Sports and Entertainment, Toronto, Ontario, Canada.

Key words: Show jumping; kinematic analysis; algorithmic logic; horse-riding.

Introduction: Five phases constitute a horse’s jump (approach, take-off, suspension, landing, departure) each with unique biomechanical characteristics, influenced by fence dimensions. Understanding biomechanical patterns in each phase is essential to improve understanding of technique and performance in show jumping. This requires the ability to split data into the different phases. Typically done manually (Patterson et al., 2010) or using commercially available devices (Becker and Lewczuk, 2022, Guyard et al., 2023), there is currently no published standardised method to achieve this using inertial motion units (IMUs) data. This study aimed to develop a logical algorithm to identify jump phases over 1.30 m fences, using IMUs synchronised with video capture.

Methods: Using a randomised order, three horse-rider pairs ($Age_{horse}: 10 \pm 5$ years, $Height_{horse}: 164 \pm 2$ cm, $Age_{rider}: 29 \pm 16$ years, $Height_{rider}: 168 \pm 4$ cm, $Weight_{rider}: 61 \pm 17$ kg), jumped a vertical and oxer, up to four times from a left/right approach. Fence height was determined by riders’ competitive level (1.00 - 1.30 m). Continuous, three-dimensional horse linear and angular kinematics were recorded using an IMU (60 Hz) taped to participants’ stud girths, digitally synchronised with sagittal plane video recording (30Hz). IMU and GPS technology was used to record horses’ discrete jump characteristics (height, length, and speed). Only complete data series were analysed, from jumps which horse and rider cleared without touching the fence. Video recordings were used to visually identify the ascending phase (AP), forelimb take-off (FLTO), hindlimb take-off (HLTO), forelimb landing (FLLA), hindlimb landing (HLLA). Data from one horse-rider pair jumping 1.00 m ($n= 8$ jumps) were used to develop a logical algorithm in MATLAB (Mathworks Inc., U.S.A.). The search window for jump events was defined according to the visually identified AP. For each fence type, the algorithm was refined using data from three 1.30 m jumps, resulting in a separate algorithm for verticals and oxers. The algorithms were tested on the remaining data series of 1.30 m jumps ($n= 9$ oxers, $n=10$ verticals). Algorithm accuracy was assessed by comparing the absolute difference between event frames identified by the algorithms and event frames identified using video recordings.

Results: Jump characteristics of the horse-rider pairs jumping 1.30m fences were ($n= 24$): jump height 1.55 ± 0.03 m; jump length 5.00 ± 0.99 m; approach speed: 3.98 ± 0.32 m.s⁻¹. Event identification accuracy varied according to fence type, horse-rider pair and jump event (Table 1), with a maximum error of 0.25s.

Table 1: Event identification accuracy (in seconds, mean \pm standard deviation) ($n= 19$ jumps) for forelimb take-off (FLTO), hindlimb take-off (HLTO), forelimb landing (FLLA), and hindlimb landing (HLLA).

Participant	Fence type	FLTO	HLTO	FLLA	HLLA
Horse-rider 1	1.30 m	0.06 \pm 0.04	0.08 \pm 0.06	0.01 \pm 0.02	0.08 \pm 0.02
Horse-rider 2	Vertical	0.05 \pm 0.07	0.06 \pm 0.04	0.01 \pm 0.06	0.06 \pm 0.13
Horse-rider 1	1.30 m Oxer	0.06 \pm 0.03	0.11 \pm 0.01	0.08 \pm 0.03	0.03 \pm 0.03
Horse-rider 2		0.05 \pm 0.04	0.10 \pm 0.08	0.04 \pm 0.05	0.07 \pm 0.05
All		0.05 \pm 0.05	0.09 \pm 0.05	0.03 \pm 0.05	0.02 \pm 0.09

Discussion and Conclusion: Jump events were identified with varying accuracy, highlighting the challenges of identifying patterns in biomechanical data. Although common trends are identifiable, biomechanical patterns are situational and their characteristics differ with fence type and dimensions, horse jumping technique, and rider cues (Clayton and van Weeren, 2012, Becker and Lewczuk, 2022). To improve and standardise event

identification in horses' jumping kinematics, a better understanding of variability in jumping technique and how it affects biomechanical data is necessary.

References:

- Becker, K. & Lewczuk, D. (2022), 'Variability of jump biomechanics between horses of different age and experience using commercial inertial measurement unit technology', *Journal of equine veterinary science*, 119, p,104146
- Clayton, H. M. & van Weeren, P. R. (2012), 'Jumping', In: Back, W. & Clayton, H. M, (eds.) *Equine locomotion*. 2nd ed.: Elsevier.
- Guyard, K. C., Montavon, S., Bertolaccini, J. & Deriaz, M. (2023), 'Validation of Alogo Move Pro: A GPS-Based Inertial Measurement Unit for the Objective Examination of Gait and Jumping in Horses', *Sensors*, 23(9), p.4196
- Patterson, M., Doyle, J., Cahill, E., Caulfield, B. & Persson, U. M. (2010), 'Quantifying show jumping horse rider expertise using IMUs', *2010 Annual International Conference of the IEEE Engineering in Medicine and Biology*, pp.684-687.

Criterion Metric Choice Alters High-intensity Phase Demands.

Andrew Hearn^{a*}, Parker, J.K.^a, Hicks, K.M.^{b,c} and Fernandes, J.F.T.^d

^aHartpury University, Gloucester, GL19 3BE

^bNorthumbria University, Newcastle upon Tyne, UK

^cWashington Spirit Soccer Club, Washington DC, USA

^dCardiff Metropolitan University, Cardiff, UK.

Andrew.hearn3@hartpury.ac.uk

Keywords: Female football, match demands, GPS, heart rate, peak demands.

Introduction: High-intensity phases (HIP) or worst-case scenarios (i.e. the highest demand phase for a set time interval) are commonly reported as the peak value for each criterion metric (Whitehead *et al.*, 2018). However, in practice these demands may not occur concurrently. Therefore, this study aimed to 1) determine if external load demands are affected by the criterion metric used to calculate 5-minute HIP demands. and 2) identify the timing of 5-minute HIPs for criterion metrics (total distance (TD), high-speed running (HSR), and sprint distance (SD)).

Materials and Methods: After institutional ethical approval, twenty female university football players (age 20.0 ± 1.3, mass 64.9 ± 12.9 kg) were monitored over 6 competitive fixtures using Global Positioning Systems (GPS; Catapult, Australia) and heart rate (HR) monitors (Polar, Finland). Players were required to play >60 minutes to be included in the analysis, totalling 53 observations with 5-minute HIP based on TD, HSR and SD using the rolling average method. Speed zones were calculated as HSR; 15.6-20.0km/h, sprinting >20.0km/h. One-way repeated measures ANOVAs were calculated for each match to determine differences between metric values and occurrence time based on the criterion metric. Where appropriate post-hoc Tukey pairwise comparisons were calculated.

Results: Differences were observed for TD ($P<0.001$), HSR ($P<0.001$), SD ($P<0.001$) and time ($P=0.001$) depending on the criterion metric. Post-hoc testing showed TD phases yielded greater TD ($P<0.001$) than HSR ($d=1.14$) and SD ($d=1.34$) and lower HSR compared to SD ($P<0.004$; $d=0.28$). HSR phases produced greater HSR ($P<0.001$) than TD ($d=0.68$) and SD ($d=0.39$) and greater TD compared to SD phases ($P=0.032$; $d=0.22$). SD phases contained greater SD ($P<0.001$) values compared to TD ($d=0.85$) and SD ($d=0.32$). Timing of the TD phase was different to HSR ($P<0.001$; $d=0.62$) but not sprint distance ($P<0.097$; $d=0.36$). HSR and SD were not different ($P<0.145$; $d=0.25$).

Discussion: These data show that the criterion metric used to determine HIPs alter the amount of distance and high intensity running for the phase. Further, these phases can occur at different time points. These findings can inform session design for coaches aiming to recreate these phases. This also suggests that presenting only peak values may not be helpful to inform the training process.

References:

Whitehead, S. *et al.* (2018) 'The use of microtechnology to quantify the peak match demands of the football codes: a systematic review', *Sports medicine*, 48, pp.2549-2575. Available at: <https://doi.org/10.1007/s40279-018-0965-6>.

A Qualitative Study of Final Year Student Veterinary Nurses' Career Plans and Expectations.

Suzannah Harniman

Hartpury University, Gloucester, GL19 3BE

Key words: Motivation; Veterinary Nurse; Career Plans; Values; Beliefs; Perceived Cost

Introduction: The limited longevity of veterinary nurses' clinical careers is a current challenge faced within the veterinary industry. In order for veterinary nurse job vacancies to be filled, it is essential for graduate veterinary nurses to be motivated to seek employment in clinical practice. The aim of this study was to explore the career plans and expectations of final year student veterinary nurses.

Method: Online semi-structured interviews, with ten final year student veterinary nurses, were used to collect qualitative data. Thematic analysis was used for the data analysis and four themes were identified.

Discussion: The results revealed that there were aspects of clinical practice the participants were looking forwards to and others they perceived would be challenging and may threaten the longevity of their clinical career. An example was the demanding nature of the job role.

All participants expressed a desire to work in clinical practice following their graduation but were aware that they were unlikely to have long-term clinical careers. It is recommended that veterinary nurse educators should support students to develop the resilience necessary for them to face the challenges of clinical practice and also help them to gain the transferable skills they may require for alternative future career paths.

Acknowledgments: This research was originally presented at The Mind Matters Mental Health Research Symposium 2023 and has now been accepted for publication in *The Veterinary Nurse*.

Hartpury Research and Knowledge Exchange Internal Research Grant

The Influence of Dominant Discourses on Strength and Conditioning Coach Education

Christoph Szedlak^a, Bettina Callary^b, Kimberley Eagles^b, & Brian T. Gearity^c

^aHartpury Sport, Hartpury University, Hartpury, UK;

^bDepartment of Experiential Studies in Community and Sport, Cape Breton University, Nova Scotia, Canada;

^cGraduate School of Professional Psychology, University of Denver, Denver, USA

christoph.szedlak@hartpury.ac.uk

Keywords: psychosocial coaching practice, athlete-centred coaching, orthodox masculinity discourse, performance-scientific discourse, discourse analysis

Introduction: Effective athlete-centred coaching practice incorporates psychosocial (i.e., psychological, pedagogical, philosophical, and sociocultural) coaching competencies. Although many coaching organisations and coach developers advocate for coaches to develop psychosocial competencies, within Strength and Conditioning (S&C) coaching, accreditation bodies, such as the United Kingdom Strength and Conditioning Association (UKSCA), have largely neglected psychosocial competencies. UKSCA Stakeholders, such as board members, tutors, and assessors, are responsible for S&C coach education, and their decisions are influenced by corresponding and historical sociocultural contexts and accepted, normalised practices. A paucity of literature exists on these overlapping issues and even less research exists that has collected data from S&C stakeholders. Thus, to understand why psychosocial competencies have been marginalised and undertheorised, we sought to critique how stakeholders' perceptions have been shaped by dominant discourses within sport culture and society more broadly. More specifically, the purpose of this study is to understand and critique UKSCA stakeholders' perceptions of psychosocial coaching practices through the lenses of dominant discourses in S&C coaching.

Method: This study is part of an ongoing, more than two-year participatory action research project with the UKSCA. Thirty stakeholders took part in one-to-one, semi-structured interviews. We conducted and recorded the interviews via Zoom and transcribed them verbatim. To prompt discussion for the interviews, participants were shown video vignettes depicting (in)effective and (in)appropriate psychosocial coaching competencies. We analysed the data in two phases. First, using thematic analysis, we deduced participants' understandings of the competencies that were shown within each vignette. Second, drawing upon post-structural discourse analysis, we critiqued how a performance-scientific coaching discourse and a discourse of orthodox masculinity affected participants' perceptions.

Results: When discussing psychological and pedagogical effective coaching approaches, participants' perceptions focused solely on athletic performance. Although participants aimed to promote a holistic athlete-centred approach, areas such as giving athletes autonomy were mostly only used if the coach was confident the athlete's decisions were in line with theirs (i.e., focusing on performance). Such normalised practice can disregard the well-being and personal development of the athlete. Participants also recognised overt sexist coaching practices, which suggest some appraisal of sociocultural and philosophical competencies. Yet, covert, sexist microaggressions towards female S&C coaches were often accepted as banter, and female coaches' emotional labour was not recognised.

Discussion: This study advances the literature by showing how the dominant culture of performance-scientific coaching and orthodox masculinity shape what is accepted as effective coaching practice within S&C. Such coaching practice de-emphasises psychosocial coaching competencies and limits the impact of equity, diversity, and inclusivity (EDI) strategies, as well as the holistic development of both athletes and S&C coaches. In line with calls for athlete-centred coaching to address the urgent need to improve outcomes for athletes and related



HARTPURY
UNIVERSITY

research in coach education, the implications of this study highlight the need for psychosocial ways of knowing within the historically natural science dominated field of S&C.

Parallel Session: Environment

Assessing the Interaction Between Grassland Swards and Soil

Sito-Obong Udofia*, Williams, L.K., Wills, A, Bell, M.J.
Hartpury University, Gloucester, GL19 3BE

Sito-Obong.Udofia@hartpury.ac.uk

Key words: Grasslands; soil; season; interactions.

Introduction: Investigative studies quantifying the effects of vegetation types such as grass, crop, hedgerow, and tree in agricultural farmland are necessary to identify novel strategies for sustainable productivity. Specifically, understanding the relationships between plant and soil factors of a grassland ecosystem can inform improved agricultural and livestock management. An initial study was carried out to investigate potential interactions between grassland swards and soil properties. The study aimed to examine the relationships between sward type, height, biomass cover and plant nutrient properties (e. g. dry matter, protein, oil, ash, dry matter digestibility, grass D value, grass NDF, grass ME, nitrate and water-soluble carbohydrate) with soil properties including organic matter content, total nitrogen content, clay content, moisture, pH and bulk density.

Materials and methods: Samples and data were collected from 24 grassland plots at Hartpury University Farm. The 24 plots consisted of either ryegrass, herbal, flower, brassica, or native grass swards in four blocks of six plots. Plant and soil nutrients were measured using Near Infra-Red Spectroscopy (NIRS) scanners (NIR4; Aunir, Towcester, UK), while a rising plate meter (F400; Farmworks Precision Farming Systems Ltd, Feilding, NZ) and W-pattern were used to measure height of swards and estimate pasture heights respectively. Biomass cover was measured by two cut and weigh samples per plot. Measurements were obtained in June, August, and November 2023. Linear Mixed Model and Principal Component Analysis were used to analyse the data in SPSS (IBM SPSS Statistics for Windows, Version 29.0. Armonk, NY).

Results: There were differences in soil carbon, bulk density, and carbon to nitrogen ratio and in plant nutrients amongst months studied. An interaction between grass type and month of study was found for soil carbon, carbon to nitrogen ratio, and grass dry matter, digestibility, metabolisable energy, nitrates, and oil contents. No effect of plant height, biomass cover or grass type on soil and plant properties was found.

Discussion: Seasonal changes and vegetation type influence ecosystems conditions and an understanding of these interactions can guide farming practices and environmental management options. Further investigation of vegetation cover and soil interactions, and understanding of the associated seasonal variations, using advanced sensors and remote sensing technology, can inform sustainable land and habitat management in a changing climate.

Acknowledgements: This work was funded by Tertiary Education Trust Fund (TETFUND) Nigeria while the Agri-Tech Unit of Hartpury University Home Farm, Hartpury University, Gloucestershire, UK, provided the tools for sample and data collection.

Reference:

Bell, M. J., Huggett, Z., Slinger, K. R., & Roos, F. (2020). 'Effect of pasture cover and height on nutrient concentrations in diverse swards in the UK.' *Grassl Sci*, 00, pp.1–6. <https://doi.org/10.1111/grs.1230>.

Perceptions of Pre-Acquisition Planning and Expected Care Investment for Companion Animal Species Amongst Animal Welfare Organisation Staff and Volunteers – a Pilot Study

Natalie Powdrill-Wells,^{a,b} Wills, A.P.^a, McCormick, W.^a and Pawson, C.^a

^aHartpury University, Gloucester, GL19 3BE, UK

^bWoodgreen Pets Charity, Godmanchester, PE29 2NH, UK

Natalie.powdrill-wells@hartpury.ac.uk

Key words: Companion animal welfare; species differences; animal rescue centre

Introduction: Animal welfare organisations (AWO) are often supported by paid staff and volunteers, in a range of roles. Individuals associated with an AWO might be assumed to have an affinity for all animals and knowledge of their needs. In reality, personnel can provide support with no direct interaction with animals. Individuals of different ages, genders and backgrounds support AWOs (Stavisky et al., 2017). Differences in attitudes towards animals in general and views of different species can be associated with demographic factors, even within groups engaged in animal welfare (Cornish et al., 2018) There is additional complexity when considering attitudes towards species used in different contexts such as dogs and rabbits. The current study was developed to explore the perceptions of animal welfare organisation staff and volunteers in relation to the importance of pre-acquisition research and expected care investment for seven species of companion animal.

Materials and Methods: An online survey was shared via internal communication channels amongst the staff and volunteers at Woodgreen Pets Charity (Cambridgeshire, England). Question sections included the participants' role at the organisation and their views of each species in terms of the importance of pre-acquisition research, willingness to pay set-up costs and suitability as a children's pet. The Friedman's test was used to compare species differences for each of the measured variables. Post-hoc Wilcoxon signed-rank tests with a Bonferroni correction applied were used where significant main effects were identified. Mann-Whitney U tests were used to test for the effect of role in the charity on each of the individual species measurement variables.

Results: 264 respondents participated in the survey. Just under half (47%) were staff members, with the remaining 53% volunteers. 56.4% of respondents provided support through the pet-related directorate of the charity known as Pet Services (PS). There was a significant effect of species on the perceived importance of pre-acquisition research, willingness to pay set-up costs, and perceived suitability as a children's pet. Significant differences were also found across each of the three investigated factors based on the participant's role at the charity (All $p < 0.05$).

Discussion: This study suggests that animal welfare organisations should take time to understand the views of their wider teams in relation to the animals that they care for to ensure that effective welfare-friendly messaging is reflected by all areas of the organisation.

Acknowledgements: The authors would like to thank the staff and volunteers at Woodgreen Pets Charity for their support with this project.

References:

Bernuz Beneitez, M.J. and María, G.A. (2022) 'Public Opinion About Punishment for Animal Abuse in Spain: Animal Attributes as Predictors of Attitudes Toward Penalties', *Anthrozoos*, 35(4), pp. 559–576. Available at: <https://doi.org/10.1080/08927936.2021.2012341>

Cornish, A. et al. (2018) 'Demographics regarding belief in non-human animal sentience and emotional empathy with animals: A pilot study among attendees of an animal welfare symposium', *Animals*, 8(10). Available at: <https://doi.org/10.3390/ani8100174>.



HARTPURY
UNIVERSITY

Stavisky, J. et al. (2017) 'Opinions of UK Rescue Shelter and Rehoming Center Workers on the Problems Facing Their Industry', *Anthrozoos*, 30(3), pp. 487–498. Available at: <https://doi.org/10.1080/08927936.2017.1326677>.

Differences in Soil Carbon Among Farmland Types

Wing Kwan Ng^{*a}, Bell, M., Teixeira, D., Crew, A., Maxfield, P.

Background and aim: Previous research promoted carbon assessment and flow of human and natural capital to remediate atmospheric carbon emissions on farms. However, differences among land use types are often not included as part of accounting methods. This study compared levels of soil organic carbon (SOC) among different land use types using real-time near-infrared spectroscopy (NIRS) analysis on farms.

Results and discussion: Soil samples of arable and temporary ley fields had a higher % of SOC/Clay ratio within 'poor' or 'suggest improvement' thresholds compared to permanent grass and woodland areas with a higher % of 'good' or 'very good' SOC/Clay ratio after NIRS analysis. Permanent and woodland areas also had higher mean SOC (g/kg), total nitrogen (g/kg) and SOC/clay ratio after statistical analysis. Although arable and temporary ley fields were more productive with a greater herbage height (cm) and cover than permanent grass (PG) fields, PG fields still had significantly better SOC and nitrogen levels.

Conclusion and future work: This study shows that NIRS can serve as a user-friendly and practical alternative for initial and effective real-time field measurements to assess soil and plant variability among land use types. Further work is needed to evaluate the confidence level on NIRS technique to support field carbon monitoring and improve its assessment among different land uses.

Hartpury Research and Knowledge Exchange Internal Research Grant

The Equine Carbon Calculator: Development Of An Industry Tool

Rachel Collins^{a*}, Dancer, R.^b, Parker, E.^c, Collins, J.^d, Treagust, M.^e and Hardwick, I.^f

^aHartpury University, Gloucester, GL19 3BE, UK,

^bWhite Griffin, Cheltenham, UK

^cFarmCarbonToolkit, Winchester, UK,

^dDerby College Group, Derby, UK,

^eSparsholt College, Winchester, UK,

^fLandex, Northampton, UK

Rachel.Collins@hartpury.ac.uk

Keywords: Sustainability; environmental sustainability; equine carbon footprint.

Introduction: The equine industry is responsible for carbon emissions which are currently unquantified. In order to manage these emissions, it is essential to be able to measure them. While carbon calculator tools are well established in agriculture (and wider industries), no equivalent equine-specific tool existed for equine-related activities. Agriculture calculators have limited accessibility for equine users but can be adapted. The aim of the project was to engage with equine industry stakeholders to build an Equine Carbon Calculator to accommodate the unique characteristics of the equine sector, through an accessible interface to inspire persons involved in managing equestrian establishments to engage with carbon calculations.

Materials and Methods: Stakeholder feedback was sought to inform the development of an equine specific interface and platform adaptation for an existing calculator (Farm Carbon Toolkit), to serve the unique requirements of the diverse equine sector, specifically yards. A development window for the calculator followed, and the platform was then launched to industry. A follow-up stakeholder feedback session has been conducted to inform on future development needs and will undergo thematic analysis as described by Braun and Clarke (2006).

Results: Initial stakeholder feedback was gained through a discussion group and this informed development of the initial platform. The equine carbon calculator has been available for use since 7th March 2024. Currently 192 accounts have been set up, with 142 reports created.

Discussion: Stakeholder feedback throughout this project has been influential in guiding developments and understanding the needs of equine industry users. Stakeholders consistently note the importance of equine specific language and terminology for equine users, and this has fed into the adjustments made. The engagement with the calculator platform so far is positive, and a large number of reports are genuine attempts and fully completed, with the remainder likely being exploratory attempts. Any engagement is likely to be indicative of an interest in sustainability and the concept and suggests wider opportunities to engage the industry. In approximately 12 months there will be sufficient data to enable overall reporting and benchmarking data from the system, which will enable yard owners to determine their performance in line with other yards. In conclusion, continued stakeholder engagement is planned to support continued development of this vital tool.

References:

Braun, V. and Clarke, V., 2006. 'Using thematic analysis in psychology.' *Qualitative research in psychology*, 3(2), pp.77-101.

Listening to Nature: Developing an Ecoacoustic Approach to Farmland Management

Lucy Garrett, **Schork, I.**, Ramos, B., Bell, M.
Hartpury University, Gloucester, GL19 3BE

Keywords: Biodiversity; Bioacoustic Monitoring; Birds; Bats; Agriculture;

Introduction: Currently we are in the midst of a biodiversity crisis with huge negative implications for effective functioning of ecosystems and the essential services they provide to humans. The UK has some of the most depleted ecosystems globally, with some of the main drivers linked to the intensification of agricultural practices. As such, the UK Government has made global agreements to halt and reverse biodiversity loss by 2030. Given such commitments to biodiversity recovery, there is increasing need to capture and assess the current and future levels of biodiversity for farmers and landowners, in order to provide evidence of the outcomes of any land management changes, and also to inform the design and implementation of such changes. Such methods to monitor biodiversity are likely to be needed over the longer term and on large spatial scales (Metcalf et al., 2022). Passive acoustic monitors (PAMs, Fig. 1) are excellent tools by which to monitor wildlife, with technology improvements and usability making them more accessible as replacements for traditional techniques (Metcalf et al., 2022). These small devices can be deployed efficiently within the environment with little to no disturbance to wildlife and a significant reduction in man hours (Darras et al., 2019). Although the use of passive acoustic monitors to measure and monitor biodiversity is increasing, ground truthing and testing of PAMs on a commercial farm is something that has not yet been undertaken in the UK. We used Hartpury Home Farm as a pilot study to establish the feasibility of a passive acoustic monitoring approach to assess bird and bat species assemblage on a commercial farm through the establishment of a grid-based network of PAMs.



Figure 1. a) Audiomoths including waterproof housing prior to deployment b) audiomoth deployed in the field approx. 1.5m above the ground attached to a tree.

Materials and Methods: We deployed eight acoustic monitors (audiomoths) in three different habitats across Home Farm, including woodland parcels, permanent or temporary grassland and crop/grazing fields. Recording took place over three days for bats between dusk and early morning, and for birds at dawn (4-8am). Monitoring was ground truthed using traditional bird and bat surveys on a subset number of days/recorders using point counts.

Results: Data using PAMs are being assessed using Raven software to assign species to each sonograph recording. For traditional surveys we detected five species of bats and 34 species of birds.

Discussion: The use of PAMs for assessing biodiversity on Hartpury Home Farm was feasible to establish, with quick deployment methods and good land area coverage. The extent of data collected was large in terms of gigabytes, and thus extraction and assignment of species to sonographs was time consuming. Though there are methods supported by AI learning that can assist species assignment, initial assessment is still time consuming and requires a higher-level skill set. Thus, for this technology to be rolled out to farmers and landowners, further development and use of automatic detection and species identification would be needed, though not impossible. It is likely that expert input and data checking would still be needed to some extent.



HARTPURY
UNIVERSITY

References:

Darras, K., et al., (2019) 'Autonomous sound recording outperforms human observation for sampling birds: a systematic map and user guide', *Ecological Applications*, 29(6). Available at: doi:10.1002/eap.1954
Metcalf, O., et al., (2022) Good practice guidelines for long-term ecoacoustic monitoring in the UK. UK Acoustics Network.

Parallel Session: Welfare

Evaluation of a Targeted Behavioural Sleep Intervention for Student-Athletes

Wilson, S. M. B., Draper, S. B., Jones, M. I., and John Parker

Hartpury University, Gloucester, GL19 3BE

Alexander.Wilson@hartpury.ac.uk

Key words: behaviour change; intervention design; health; sport

Introduction: Previous research has highlighted that student-athletes display sub-optimal sleep characteristics that may negatively impact academic attainment, sport performance, and general health and wellbeing. There is limited empirical literature exploring the use of behavioural interventions in this population to improve sleep. Therefore, this study aimed to assess the utility of a targeted intervention designed to modify sleep behaviours in student-athletes.

Materials and methods: The intervention design was based on the COM-B model of behaviour change. The intervention focused on enhancing psychological capability and motivation through a 40-minute in-person interactive workshop highlighting the consequences of poor sleep and addressing common perceived barriers to sleep. Personalised visual feedback on current sleep practices was also provided. These intervention components incorporated nine distinct behaviour change techniques from the Behaviour Change Technique Taxonomy. Wrist-worn actigraphy (GENEActiv, Activinsights) was used to evaluate sleep timing, duration, and consistency using the Sleep Regularity Index (SRI). Fifteen male Rugby Union student-athletes (mean age: 19 ± 1y) competing at a regional level completed the intervention. Descriptive analyses are presented as median (interquartile range). Wilcoxon signed-rank tests were used to compare outcomes between baseline and a follow-up assessment conducted five weeks post-intervention, with effect sizes and 95% confidence intervals (1000 bootstrapped samples) presented.

Results: Table 1 presents sleep outcomes at baseline and post-intervention, and the magnitude of differences between timepoints. No statistically significant differences were observed in sleep parameters (all $p > .05$), with medium effect sizes indicating increased total sleep time including naps and earlier sleep onset times post-intervention. Ten out of 15 participants increased their total sleep time including naps post-intervention, however nocturnal total sleep time was only increased in 7 out of 15 student-athletes.

Table 1. Sleep outcomes at baseline and post-intervention. Note: Sleep outcomes are presented as median (interquartile range).

Variable	Baseline	Post-intervention	Effect size (95% CI)
Sleep period (hr)	7.51 (6.98 to 8.03)	7.78 (7.08 to 8.30)	0.08 (-0.50, 0.67)
Total sleep time (hr)	6.43 (5.97 to 6.99)	6.47 (5.92 to 7.17)	0.20 (-0.38, 0.73)
Total sleep time incl. naps (hr)	6.69 (6.24 to 7.08)	7.06 (6.31 to 7.42)	0.42 (-0.10, 0.88)
Wake after sleep onset (hr)	1.09 (0.87 to 1.31)	1.04 (0.93 to 1.20)	-0.15 (-0.70, 0.47)
Sleep efficiency (%)	85.9 (83.2 to 88.0)	86.5 (83.7 to 89.0)	0.19 (-0.39, 0.73)
Sleep onset (hh:mm)	01:06	01:08	-0.34



HARTPURY
UNIVERSITY

	(00:42 to 01:54)	(00:44 to 01:31)	(-0.82, 0.25)
Sleep offset (hh:mm)	08:36 (08:29 to 08:53)	09:01 (08:15 to 09:09)	-0.16 (-0.70, 0.46)
Sleep Regularity Index (units)	70.5 (66.1 to 73.6)	69.5 (63.1 to 79.6)	0.06 (-0.51, 0.65)

Discussion: This study corroborates previous findings indicating that student-athletes have short sleep durations and inconsistent sleep patterns. While the intervention did not significantly change sleep parameters, it may protect against worsening sleep outcomes related to increasing academic-related demands throughout a semester. Accordingly, further exploration in a larger sample with a control group is warranted. In addition, addressing barriers that would require structural-level changes, such as modifications to training schedules, may prove to be a more effective approach to improving sleep in student-athletes.

Computer Vision for Dairy Cow Behaviour Monitoring: Enhancing Animal Welfare and Management Practices

Misbah Ahmad

Hartpury University, Gloucester, GL19 3BE

Keywords: Livestock; Computer Vision; Deep Learning; Object Detection; Activity Monitoring

Introduction: Automated dairy cow activity detection plays a pivotal role in modern livestock management, significantly impacting animal welfare and farm management practices. Traditional methods are labour-intensive and prone to inaccuracies, necessitating advanced solutions. This study aims to introduce an automated computer vision-based approach for dairy cow activity detection, demonstrating its impact and applications in enhancing livestock management practices.

Materials and Methods: The computer vision model addresses the simultaneous detection and precise localization of three primary dairy cow activities in the input image: standing, lying, and walking. The methodology involves fine-tuning a pre-trained model using a dataset collected from a real-time barn environment at Hartpury University Farm. Key steps include data pre-processing and model fine-tuning. Data augmentation techniques, such as random cropping, flipping, and rotation, ensure dataset diversity, enhancing the model's generalization across various lighting conditions and cow orientations. The pre-trained model, initially trained on a general object detection dataset, is adapted to the specific nuances of dairy cow activities through training on a custom cow activity dataset.

Results: Experimental results demonstrate the model's effectiveness in identifying and localizing dairy cow activities. The model correctly predicted standing, lying, and walking events with accuracy rates of 0.94, 0.92, and 0.89, respectively. Table 1 summarizes the accuracy rates for each activity.

Table 1: Accuracy Rates for dairy cow activity detection

Activity	Accuracy Rate
Standing	0.94
Lying	0.92
Walking	0.89

Discussion: These results highlight the model's capability to accurately detect and classify distinct dairy cow behaviors, offering significant improvements over traditional methods. The high accuracy rates underline the model's potential to enhance animal welfare by enabling timely interventions based on precise activity monitoring. This approach also optimizes farm management practices, reducing labour costs and improving efficiency. The integration of Vision AI into livestock monitoring systems demonstrates its impact and application in the industry, benefiting both operational practices and animal care standards. By providing real-time, accurate insights into dairy cow behaviour, Vision AI systems facilitate proactive management decisions, contributing to healthier herds and more sustainable farming operations.

Evaluation of the Drinking Behaviour of Housed Dairy Cows During the Final Period of Pregnancy

Akin Adebayo ^{a*}, Stratakos, A. ^b, Enriquez-Hidalgo, D. ^b, Bell, M. ^c and Teixeira, D. ^c

^a University of the West of England (UWE), Bristol

^b University of Bristol (UoB), Bristol

^c Hartpury University, Gloucester

akinropo.adebayo@uwe.ac.uk

Keywords: water intake; production; proportion; frequency.

Introduction: Cows exhibit different behavioural changes before calving, and numerous studies have been conducted to monitor these behaviours (Cavendish et al., 2021). However, the drinking behaviour of dairy cows during pregnancy has been largely overlooked. This study, therefore, fills a crucial gap in the existing research by evaluating changes in this specific behaviour. Understanding the daily drinking behaviours of cows on a farm can provide practical insights to maintain production efficiency and predict possible health and comfort issues (Ertugrul et al., 2020). Hence, this study aimed to evaluate changes in drinking behaviour among housed dairy cows during pregnancy, underscoring its direct relevance to the dairy industry.

Materials and methods: Data were obtained from a previous study conducted at the Nottingham University Dairy Centre (Sutton Bonington, Leicestershire, UK) studying 35 pregnant (17 primiparous and 18 multiparous) Holstein-Friesian dairy cows between April and June 2018 (Cavendish et al., 2021). A 10-hour period of video footage was annotated for each cow's behaviours of drinking, eating, lying, walking, and standing for three weeks before calving. Video cameras were continuously used to record these cows in three calving pens. A total number of observations and duration of behaviours were obtained for each cow and expressed as the proportion of total observations and time within four 6-hour periods of the day. The day was split into period one (00.00 to 06.00 hours), period two (06.00 to 12.00 hours), period three (12.00 to 18.00 hours) and period four (18.00 to 24.00 hours). This approach provided 700 behavioural records for the analysis (35 cows x 5 behaviours x 4 time periods). IBM SPSS Statistics software was used to analyse behaviour records using a Generalised Linear Mixed Model, with duration and frequency of behaviours considered as the dependent variables.

Results: There were differences in the duration of behaviours displayed by the cows ($P < 0.001$). Cows spent most of their time either standing or lying and between 1 and 6% of their time drinking, eating, or walking. An interaction was observed between the period of the day and the duration of behaviours ($P < 0.001$), with the cows spending more time drinking in period 3 (Figure 1). Differences were also found in the frequency of behaviours ($P = 0.001$), with most behaviour observations (90%) being either standing or walking and between 1 and 4% of observations being drinking, eating or lying. An interaction was also noted between the period of the day and the frequency of the behaviours ($P = 0.001$), with drinking being the least exhibited behaviour among the four periods (Figure 1).

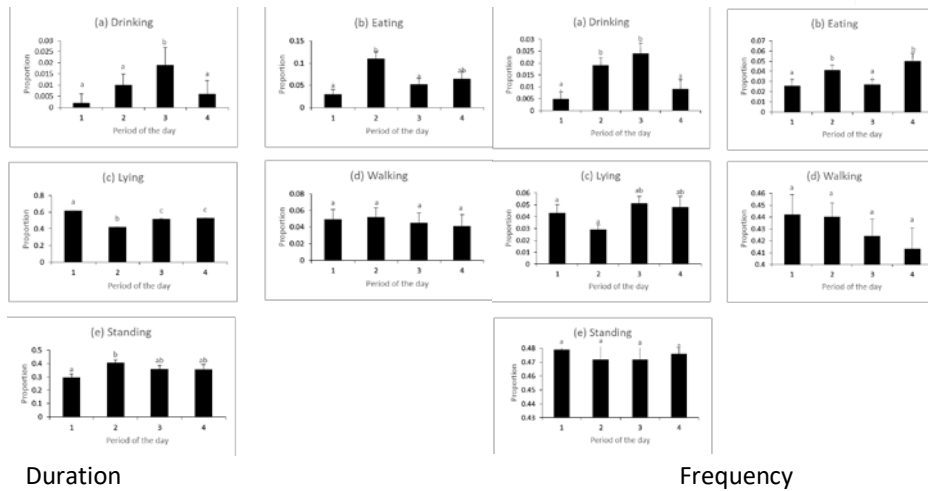


Figure 1. Predicted mean (+SEM) duration and frequency of behaviours for a) drinking, b) eating, c) lying, d) walking and e) standing as a proportion of time and observations during periods of the day. Periods 1, 2, 3 and 4 were 00.00 to 06.00, 06.00 to 12.00, 12.00 to 18.00, 18.00 to 24.00 h during the day, respectively. Periods bearing different letters differ at $P < 0.05$.

Discussion: The duration and frequency of drinking were found to change during the day. Also, the differences in our results compared to other researchers could be attributed to a lack of proper standardisation of the characteristics of drinking behaviour. Burkhardt et al. (2022) stated that the observed heterogeneity among various results could be explained by the fact that drinking behaviour characteristics in dairy cows are rarely defined or standardised. Future research is encouraged to develop practical methods that are acceptable to all researchers.

References:

- Burkhardt, F.K., Hayer, J.J., Heinemann, C., Steinhoff-Wagner, J. (2022). 'Drinking behavior of dairy cows under commercial farm conditions differs depending on water trough design and cleanliness.' *Appl. Anim. Behav. Sci.* 256, p.105752.
- Cavendish, B., McDonagh, J., Tzimiropoulos, G., Slinger, K.R., Huggett, Z.J., and Bell, M.J. (2021). 'Changes in Dairy Cow Behavior with and without Assistance at Calving.' *Agriculture* 11(8), p.722. <https://doi.org/10.3390/agriculture11080722>.
- Ertuğrul, M., Zengin, K. and Tarhan, S. (2020). 'Araştırma/Research Development of a new automatic water intake measurement and recording system to monitor individual water drinking behaviours of cattle.' *Anadolu Tarım Bilim. Derg./Anadolu J. Agr Sci*, 35. [doi.org//10.7161/omuanajas.673790](https://doi.org/10.7161/omuanajas.673790).

Hartpury Research and Knowledge Exchange Internal Research Grant

Establishing the use of Bioelectrical Impedance Analysis for Assessing Body Condition in Domestic Dogs (*Canis Lupus Familiaris*).

Wanda McCormick,*^a Favier, B.^a and Malik, A.^b

^a Hartpury University, Gloucester, GL19 3BE, UK

^b Maltron International Ltd, 20 Sirdar Road, Rayleigh, Essex, SS6 7XF

wanda.mccormick@hartpury.ac.uk

Keywords: dog health, weight management, obesity

Introduction: Excess body fat in dogs has become an increasingly common health problem that veterinarians face, and obesity increases the risk of the early onset of chronic pain, disease, and mortality. The prevalence of elderly pets is also rising, which has resulted in an increase in cases of cachexia and sarcopenia which are associated with a wide range of diseases. In both of these scenarios, monitoring weight and body composition supports veterinary care but represents a challenge, as the commonly used methods have their limitations. Measuring body weight is simple, objective, and repeatable, but it cannot quantify body fat versus lean body mass. Body condition scoring (BCS) is the most frequently used system to evaluate body fat through visual assessment and palpations of the body, giving a score based on a standardised scale. However, BCS is a subjective semi-quantitative method which can be prone to interobserver variation, and it also presents a challenge when considering the wide variety of dog breeds and associated physical characteristics. Bioelectrical impedance analysis (BIA) is a widely used non-invasive and low-cost method to measure body composition in human healthcare that offers a quantitative alternative to BCS which may circumvent some of the limitations of current body condition monitoring in veterinary settings. The aim of this study was to explore both the practicalities of using BIA in domestic dogs and the correlation between BIA and the current methods of measuring body condition.

Material & methods: 46 healthy adult dogs of various breeds were identified. For each dog measurements were taken for body mass, limb length, spine length, chest girth, and waist girth, and a BCS assigned using a standard 5-point scale. BIA readings were then taken twice from each dog using the Bioscan 920 with contact points made on the foot pads of one fore- and one hind-limb. Correlational analysis was used to compare impedance with other measurements.

Results: Preliminary findings suggest that consistent BIA readings can be taken from the foot pads of dogs. This presentation will explore the initial analysis with 50Hz impedance readings.

Acknowledgments: We would like to acknowledge the support of Maltron International Ltd in loaning the Bioscan 920 and providing technical expertise. We would also like to thank the owners of all participating dogs.

A Preliminary Evaluation of the Pattern of Development of Concurrent Hoof and Third Metacarpal Asymmetry in the Developing Thoroughbred Yearling

Kirsty Lesniak*

Hartpury University, Hartpury, Gloucestershire, GL19 3BE

Keywords: Symmetry; skeletal; growth; loading

Introduction: Asymmetry is sometimes talked about synonymously with laterality. Whilst (a)symmetry and laterality are connected, they are indeed two separate phenomena. Whilst further research is needed to confirm an association, the little evidence currently available does seem to support a relationship between laterality and the symmetry of bilateral skeletal traits in horses (Leśniak et al., 2012). Stance preference has been shown to influence the symmetry of hoof conformation, particularly the angulation of the dorsal hoof wall (DHW) in youngstock (van Heel et al., 2006). The limited studies available in foals do suggest a marginal left lateralisation for forelimb protraction (van Heel et al., 2006) or movement preference and that this laterality is reflected in hoof symmetry which can persist into adulthood (van Heel et al., 2010). The concurrent imbalanced loading through the youngsters' growth plates could result in disruptions to skeletal growth in one or both limbs. To date, there is a paucity of research into limb length discrepancies in youngstock; some of which could manifest as a result of the spread grazing posture of the forelimbs adopted by youngstock. The aims of the current project are therefore:

- to ascertain whether changes in hoof conformation within Thoroughbred yearlings are reflected by fluctuations in MCIII asymmetry.
- to ascertain whether lateral stance preference in Thoroughbred yearlings is reflected by fluctuations in MCIII asymmetry.

Materials & Methods: The forelimbs of ~15-19 Thoroughbred yearlings are being assessed at two data points (1) January/ February 2024 (n=19), 2a) June 2024 (n=9), 2b) September/ October 2024 (n=max. 11)). Assessments include radiographs of the entire length of the third metacarpal (MCIII), direct measurements of the hooves and distal limbs using Invicta metric callipers, and dorsal and lateral digital images of the hooves. Behavioural observations of the yearlings within a week of the radiographic and direct measurements enable the presence and direction of a lateralised stance preference to be determined.

Hoof and bone measurements will be analysed to determine asymmetries in length and width of MCIII at either timepoint; alterations in symmetry between the two time points; and how hoof structure and symmetry alter within the same timepoints. Directionality of lateralised stance preference enables analysis of the structural asymmetries in relation to loading asymmetries in the yearlings' stance.

Results /Discussion: Analysis of the first dataset is currently being undertaken and the second data collection from nine of the yearlings will be complete by mid-June enabling early comparisons to be drawn for a subset by the time of the Research Conference.

This is a pilot study, aimed at providing evidence to pump-prime a larger, external grant, to look at a larger number of horses from a younger starting age. Lessons have been learnt from the data collection that has been undertaken so far, which will result in changes being made to the design of the methods for the larger project; these lessons learnt provide a good discussion point in the evaluation of the project to date.

Acknowledgements: Three Counties Equine Hospital, Hartpury University RKE Committee

References:

Leśniak, K., Lawson, H., & Mitchell, J. (2012). 'Associations between limb lateralisation and hoof and limb asymmetries in adult horses.' 7th International Conference on Equine and Canine Locomotion.
van Heel, M. C. V., Kroekenstoel, A. M., van Dierendonck, M. C., van Weeren, P. R., & Back, W. (2006). 'Uneven feet in a foal may develop as a consequence of lateral grazing behaviour induced by conformational traits.' *Equine Veterinary Journal*, 38(7), pp.646–651. <https://doi.org/10.2746/042516406X159070>



HARTPURY
UNIVERSITY

van Heel, M. C. V., van Dierendonck, M. C., Kroekenstoel, A. M., & Back, W. (2010). 'Lateralised motor behaviour leads to increased unevenness in front feet and asymmetry in athletic performance in young mature Warmblood horses.' *Equine Veterinary Journal*, 42(5), pp.444–450. <https://doi.org/10.1111/j.2042-3306.2010.00064.x>

The Hartpury Sports Business Hub

The Hartpury Sport Business Hub (HSBH), established in 2020 as a Community of Practice seeks to connect students with sport and business organisations. Through connection, students gain opportunities to engage in ‘real world’ research, jobs and placements, which have impact both locally and nationally. The Hub was conceived alongside the development of a MSc Sports Management where students are placed within a live, authentic project assessment experience. The below projects are from currently MSc students who have been working with a wide range of organisations offering support and assistance, including within the Gloucester Shared Prosperity funding initiative.

Website: <https://www.hartpury.ac.uk/commercial/sports-business-hub/>

Our Services : <https://www.youtube.com/watch?v=X93RxKAwJPM&t=2s>

Email: SportBusinessHub@hartpury.ac.uk

Sports Business Consultancy Projects – assessment presentations

Poppy-Ann James – [Great Western Air Ambulance.](#)

To understand the public perceptions of the Great Western Air Ambulance Charity in the South West Region: A comparative approach between FOD and Stroud region.

Jessica Kershaw – [Cheltenham and Gloucester Gymnastics Club.](#)

The development of an interactive calendar and importance of website automation within SMEs

Robyn Tucker – [Gloucestershire Badminton.](#)

Income generation: Developing and presenting a sponsorship opportunity.

Steve Sarkodie – [Geltman and Co.](#)

Exploring the elements of an effective website for SMEs.

Faye Bamford – [Gloucestershire County Cricket Club.](#)

To understand if GCCC is the most viable option for the ECB to pick as both a Tier 1 team following the women’s league restructure and a ground to hold the 2026 women’s World Cup

Jonti Boyland – [Global Venue Services](#)

Identifying the back-office service provision opportunities within the UK sports market.

Benjamin Hammett - [Hartpury Sports Academy](#)

Digital Marketing and Social Media Strategy for Hartpury FC: Enhancing Online Presence and Fan Engagement for a Non-League Football Team

Gabi Skov – [Busy Brain Breaks](#)

To launch and grow Busy Brain Breaks by developing a marketing strategy that details how the business will be promoted to potential customers within the first 12-months of trading

Sami Reinhard - [Hartpury Sports Academy \(Women’s football\)](#) What is it about Hartpury women FC that make it work (or not)?

Luke Boden – [Lions Sport Academy](#)

Are Rugby teams and coaches open to the use of Lions Sport Academy tackle height programme?

Research Posters

Faye Bamford	2026 women's world cup tender bid and the future of women's cricket in the south west of England
Emily Bate	Ground reaction forces experienced by agility dogs over different jump widths
Tahira Batool	Application of machine learning to screen hyperspectral data to monitor plant health
Amy Clarke	An investigation into owners' perception of their senior dog and how this influences their use of pharmaceuticals and nutraceuticals
Charlotte Drew	A case study of the views of RVNs in one UK veterinary hospital on brachycephalic welfare and breeding practices
Tilly Edmund	Building a profile of riders in riding schools in the UK
Christy Maddock	Effect of pole distance on spinal kinematics at walk
Raj Mohan	Prediction of rectal temperature using infrared thermography in Holstein dairy cows
Luke Norris	Perceived and received social support functions among UEFA B licensed women football coaches
Laurence Protheroe	Undergraduate students' perceptions of a problem-based learning biomechanics module
Megan Shambrook	An investigation into canine owners' knowledge of <i>Brucella canis</i> in the UK in 2023
Melanie Stemper	Establishing a protocol to identify markers of postural control using a riding simulator – a pilot study
Helen Tedds	Quality of care advice given to first time corn snake (<i>Pantherophis guttatus</i>) owners
Day Teixeira	Effect of different light regimes on sleeping behaviour of pair-housed pigs
Day Teixeira	Effect of water trough location and social rank on the drinking behaviour of dairy cows
Vicki Walker	How does walking and trotting over ground and raised poles alter the spinal kinematics of the horse?
Vicki Walker	Does thoracolumbar flexion-extension during a croup reflex relate to thoracolumbar flexion-extension range of motion at walk and trot?
Jane Williams	Transforming Retraining: Supporting racehorses to have successful second careers

Research Poster Abstracts

2026 WOMEN'S WORLD CUP TENDER BID AND THE FUTURE OF WOMEN'S CRICKET IN THE SOUTH WEST OF ENGLAND

Bamford F, Green M*

Author Affiliations: Hartpury University, Gloucestershire, GL19 3BE

Key Words: Female Sport Limitations; Venue Location; Sport Development; Event Legacy

Introduction: In 2022 it was revealed that England and Wales would host the 2026 Women's T20 World Cup and, as a result, English and Welsh cricket grounds must enter a tender bid which, if successful, would allow them to become a host venue for the event. Gloucestershire County Cricket Club (GCCC) is one of the venues in the South West that has entered this process with a particular interest in including the 'Inspiring Generations' initiative in their long-term plans for women's cricket. Further to this, GCCC has also entered an 'Invitation to Tender' alongside other South West venues to become a Tier 1 women's cricket ground. This tender is the beginning of a three-tier restructure of women's cricket, named 'Project Darwin', by the ECB, which will have major implications for women's cricket.

This project endeavours to explore the current environment for women's cricket in England and Wales (Cortis, 2009; Motameni et al., 2014; Kaim, 2015) and offer a comprehensive review of whether GCCC is the best long-term base for women's cricket in the South West. The aim of the project is to investigate whether GCCC is the ideal candidate to receive the 2026 T20 Women's World Cup via the tender process for the long-term development of women's cricket. This aim was achieved through a series of objectives listed below:

- Identify the current landscape of women's cricket in England and Wales and current initiatives to increase uptake of the sport.
- Identify the possible requirements of a World Cup venue for women's cricket in England and Wales both infrastructurally and locally.
- Analyse the link between hosting major cricket events and the long-term development of cricket in the South West.
- Critique how ECB initiatives and restructure directly link to the future of women's cricket at GCCC.

Material and Methods: This study was a qualitative research study utilising interviews, with a large methodological critical literature review aspect. To gain the qualitative data, three in-depth interviews were conducted to gain different perspectives of the landscape of women's cricket, with the maximum time of the interview being 60 minutes. Candidates were selected using purposive sampling to include those with the best experience and information on the project (Rashidi et al., 2014). Transcripts of the interviews were developed by the author and supplemented into the discussion of the research process, which provided insight to the subjective nature of this project. From the transcripts, thematic analysis was conducted to identify, analyse and interpret patterns of meaning within the data.

Results and Discussion: At the time of abstract submission, the results of this project are unknown as the project is in its data analysis phase. The submission for this project is 5th July, meaning that this information will be available shortly. The data analysis is following a typical thematic analysis tree, by deciphering themes and sub themes from the interview that align with the objectives of the project. More information can be provided upon request.

References:

- Cortis, N., (2009) 'Social inclusion and sport: Culturally diverse women's perspectives.' *Australian journal of social issues*, 44(1), pp.91-106.
- Kaim, D., (2015) 'Barriers to women's participation in sport and active recreation.' *Int J Phys Educ Sports Health*, 2, pp.96-8.
- Motameni, A., Hemati, A. and Moradi, H., (2014) 'Identifying and prioritizing the barriers for women's sports activities.' *Sport Management Studies*, 6(24), pp.111-130.
- Rashidi, M.N., Begum, R.A., Mokhtar, M. and Pereira, J.J., (2014) 'The conduct of structured interviews as research implementation method.' *Journal of Advanced Research Design*, 1(1), pp.28-34.

GROUND REACTION FORCES EXPERIENCED BY AGILITY DOGS OVER DIFFERENT JUMP WIDTHS

Bate, E.*

Hartpury University, Gloucester, GL19 3BE

Key words: Dogs; agility; landing force; jump width.

Introduction: Dog agility is a timed obstacle course for a dog to run while being guided by their handler. Courses include jumps, tunnels, and ramps which test a dog's fitness and training and the owner's ability to direct their dog. This requires advanced mental and physical capabilities from the dog including bursts of energy and quick direction changes. Jumping is a large part of agility competitions and the force on a dog's limbs during landing is one of the main causes of injury to agility dogs. Research by Pogue, Zink, and Kieves (2022), Birch and Lesniak (2013), and Pfau et al. (2011) evaluated how the height of a jump can affect the landing force on a dog's limbs and the angle of the joints as they land, but there is less research on the effect of the width of the jump. The aim of this study was to investigate how altering the jump width can affect the peak ground reaction forces agility dogs experience on their forelimbs when landing.

Material & methods: A sample of seven large agility dogs completed three different jump widths, 0cm, 25cm, and 50cm, three times each, landing on a pressure plate to measure the force on landing. Only large agility dogs that regularly took part in agility, were fit, healthy and between the ages of two and eight were included within the study. Any dogs with musculoskeletal pathologies and brachycephalic breeds were excluded from the study. The peak forces were divided by the dog's weight before using SPSS to analyse the data. The Spearman's Rho test was used to determine any correlation within the data.

Results: This study indicated there was no strong correlation between the force per kilogram on the landing forelimbs between any of the groups ($r < 0.5$) except between the groups of '25cm Jump Landing Forelimb' and '50cm Jump Landing Forelimb' ($r_{s(21)} = .604$, $p = .004$).

Discussion: Results from this study indicate that there is no correlation between width of the jump and the force per kilogram on the forelimb on landing of large agility dogs. These results could be applied to the agility industry by justifying the Kennel Club guidelines as appropriate for course and obstacle design. Results show that a large agility dog can jump a 50cm width without increasing the force on their limbs any more than a normal single hurdle, suggesting that these dogs can jump up to these widths without serious damage. For this research to be applied fully to help improve course design there needs to be further research to consider the impact angle, height of the jump, the speed of agility dogs over different obstacles and on different surfaces, and how each of these factors can affect the forces on dogs' limbs.

References:

Birch, E. and Lesniak, K. (2013) 'Effect of fence height on joint angles of agility dogs', *The Veterinary Journal*, 198(1), pp. 99-102. Available at: <http://dx.doi.org/10.1016/j.tvjl.2013.09.041>

Pfau, T. et al. (2011) 'Kinetics of jump landing in agility dogs', *The Veterinary Journal*, 190(2), pp. 278-283. Available at: <https://doi.org/10.1016/j.tvjl.2010.10.008>

Pogue, J., Zink, C., and Kieves, N. (2022) 'Effects of jump height on forelimb forces in Border Collies', *Frontiers in Veterinary Science*, 9(1), pp. 1-8. Available at: <https://doi.org/10.3389/fvets.2022.1006990>

APPLICATION OF MACHINE LEARNING TO SCREEN HYPERSPECTRAL DATA TO MONITOR PLANT HEALTH

Tahira Batool^{a*}, Joel Allainguillaume^a, Wenhao Zhang^b, Matt J. Bell^c

^a Department of Health and Applied Sciences, University of the West of England, Bristol, BS16 1QY

^b Centre for Machine Vision, School of Engineering, University of the West of England, Bristol, BS16 1QY

^c Animal and Agriculture Department, Hartpury University, Gloucester, GL19 3BE

Keywords: Hyperspectral data, Machine learning, Plant pathogens.

Introduction: Plant diseases are a significant cause of economic loss in crop production around the globe (Cheshkova, 2022). According to the Food and Agriculture Organization of the United States (FAO), every year 20% to 40% of crops are affected by plant diseases which costs \$22 billion to the global economy (Sarkozi, 2009). To stop spreading the disease, it is crucial to adopt preventative measures at an early stage of pathogen (Dzahini-obiatey, Domfeh and Amoah, 2010). In the last decade, a large number of non-invasive techniques have been introduced, that proved to be increasingly accurate, cost-effective, non-destructive and consistent (Zhang et al., 2020). Applications of these non-invasive methods using sensor technologies, robotics, computer vision and machine learning are increasing rapidly for plant disease detection as these methods tend to produce real time results with high throughput (Cheshkova, 2022). This study aims to Adopt non-invasive method to automatically detect pathogens (such as Cacao Swollen shoot virus (CSSV)) and monitor plant health by using spectral information in real time and at an early stage. It is also aimed to Identify spectral features crucial for disease detection in Ultraviolet (UV) to Shortwave Infrared (SWIR) electromagnetic band. Also, this work includes analysis of British trees and their pathogens in terms of species classification. Further, this study also focus on identification of plant stress caused by nutrients deficiency.

Materials and Methods: Spectroradiometer RS-3500 (Spectral Evolution Inc.) was used to collect 2151 spectral bands of data creating a spectral signature as output. 844 cacao leaves data samples were analysed via machine learning processing to detect CSSV. Various normalisation procedures (min-max, z-score) were carried out including wavelet transform analysis being under process. The analysis was initiated with statistical techniques such as Principal Component Analysis (PCA) followed by other robust machine learning models such as Support Vector Machines (SVM), Random Forest (RF) and currently the data is being analysed by using Convolutional Neural Networks (CNN).

Results: The advanced hyperspectral technique has turned out to be quite promising in classifying diseased and healthy leaf samples along with the application of machine learning algorithms. From conventional to complex, various machine learning algorithms were tested and witnessed enhanced accuracy in terms of classification with convolutional neural network (CNN) identifying the diseased samples with the accuracy of 83%.

Discussion: Hyperspectral spectroscopy hybridized with machine learning algorithms can be referred as the new frontier for non-invasive detection of asymptomatic pathogens with fast, on field and with high efficiency. In this work, spectral cacao samples were analysed using state of the art machine learning algorithms where developed models were proven to be successful in classifying healthy and infected cocoa samples with highest accuracy of 83% marking it the first and novel method for the detection of cocoa swollen shoot virus.

References:

- Cheshkova, A.F. (2022) A Review of Hyperspectral Image Analysis Techniques For Plant Disease Detection and Identification. *Vavilovskii Zhurnal Genet Seleksii* [online]., pp. 202-213.
- Dzahini-obiatey, H., Domfeh, O. and Amoah, F.M. (2010) 'Over Seventy Years of a Viral Disease of Cocoa in Ghana: From Researchers' Perspective', [Preprint]. *African Journal of Agricultural Research*. 5(7), pp. 476-485.
- Sarkozi, A. (2009). New standards to curb the global spread of plant pests and diseases, *Food and Agriculture organization of the United States*. Available from: <https://www.fao.org/news/story/en/item/1187738/ico de/> [Retrieved April 22, 2023]
- Zhang, N., Yang, G., Pan, Y., Yang, X., Chen, L. and Zhao, C.A. (2020) Review of Advanced Technologies and Development for Hyperspectral-based Plant Disease Detection in the Past Three Decades. *Remote Sensing*. 12, p. 3188.

AN INVESTIGATION INTO OWNERS' PERCEPTION OF THEIR SENIOR DOGS AND HOW THIS INFLUENCES THEIR USE OF PHARMACEUTICALS AND NUTRACEUTICALS

Clarke, A.

Hartpury University, Gloucester, GL19 3BE

Keywords: Veterinary, Animal Welfare, medication and supplement use.

Introduction: Senior dogs are a growing population within the veterinary industry; because of this it is important to explore owners' knowledge and perceptions of the ageing process to reduce barriers to care. This project aims to investigate the relationship between owners' level of knowledge and their use of pharmaceuticals and/or nutraceuticals, the age at which owners identify their dogs as senior and the factors that influence owners' choice to use or not use pharmaceuticals and nutraceuticals.

Methods: An online questionnaire was distributed via Facebook, and a mixed methods approach was utilised. Quantitative and qualitative analysis was conducted via SPSS, using Spearman's rank correlation, and content analysis.

Results: A weak positive monotonic relationship was found between owners' knowledge level and the age at which they started nutraceuticals, showing owners' level of knowledge increased as the age at which they started nutraceuticals increased. Alongside this, participants identified eight years as the mean age at which dogs become senior, which somewhat agrees with current literature. "Lack of finance" and "lack of information" were the most popular reasons for non-use of pharmaceuticals and nutraceuticals, whereas "dog's comfort" and "Pain relief" were common reasons amongst those who do use products.

Discussion: Increasing education and the accessibility of evidence-based information, as well as available and affordable preventative care, is essential to bridge the gap in owners' knowledge to facilitate the best standard of care of senior dogs. This study has shown that a good relationship with the VS, providing accessible preventative healthcare and evidence-based information is important, as well as understanding owners' apprehensions of these products, to provide the best standard of care for a growing demographic of canine patients.

A CASE STUDY OF THE VIEWS OF RVNS IN ONE UK VETERINARY HOSPITAL ON BRACHYCEPHALIC WELFARE AND BREEDING PRACTICES

*Drew, C**

Hartpury University, Gloucester, GL19 3BE, UK

Keywords: Registered Veterinary Nurses, Brachycephalic Obstructive Airway Syndrome, Breeding Standards, Breeding Regulations

Introduction: Animal Welfare constitutes a fundamental aspect of the daily responsibilities of all veterinary professionals, encouraging the promotion of ethical decision-making and provision of optimal care for patients. Registered Veterinary Nurses (RVNs), in particular, serve as advocates and voices for their patients who cannot communicate their needs themselves. Brachycephalic welfare has become an increasing concern over the past decade due to the rise in ownership, with French Bulldogs officially becoming the UK's most popular dog, overtaking the Labrador Retriever with an increase of 3000% in ownership in the past 10 years. The breeding practices and breeding standards of brachycephalic dogs have been scrutinized in relation to animal welfare due to the concoction of pre-dispositions and disorders that are consequential to brachycephalic breeding and anatomy. This study aimed to establish Registered Veterinary Nurses' opinions on the welfare and breeding practices of Brachycephalic dogs in the UK. The objectives of this study were to investigate RVNs' perceptions and beliefs on brachycephalic patients, interview RVNs and explore the impact of nursing brachycephalic dogs, and to explore and identify how we can mitigate and improve the welfare and breeding practices of these breeds.

Materials and Methods: Data were collected through anonymised in-person interviews following a case study approach, using six RVNs in one veterinary hospital. The veterinary hospital and some participants were known to the researcher, therefore, to mitigate bias during the recruitment process, the researcher only had direct contact with the head Veterinary Nurse of the practice. Furthermore, those who met the study's criteria voluntarily self-nominated for participation. Inclusion criteria were that participants had to have been registered with the Royal College of Veterinary Surgeons (RCVS) for a minimum of three years and have had experience working with brachycephalic dogs. To mitigate bias during interviews, the researcher had prepared interview questions that were pre-approved by the Hartpury University Ethics Committee. The interviews were audio recorded, transcribed, and analysed following Braun and Clarke's approach to conducting thematic analysis.

Results: The overarching theme for this study was RVNs' opinions on breeding and welfare practices, with seven themes identified: respiratory issues, other prevalent issues, emergencies, obstruction, regulations, education and RVNs' perceptions and opinions. Through analysis of the transcripts, the participants all identified concerns within these areas in relation to brachycephalic welfare. Participants expressed similar views on how to improve brachycephalic welfare and breeding practices, noting that the adverse impact of breeding on brachycephalic welfare has become normalised.

Discussion: The data produced from this research portrayed the demand for further awareness and transparency within the veterinary community, breeders, and future owners to improve canine brachycephalic welfare in concurrence with breeding standards. A limitation of this study is that it was conducted in one practice, meaning future research could apply this methodology and compare across a plethora of practice types such as general practice and referral. Further research could also assess how breeding practices could be more regulated in the UK, and the implementation and benefits of pre-purchase consultations in veterinary practices.

BUILDING A PROFILE OF RIDERS IN RIDING SCHOOLS IN THE UK

Edmund. M, Williams. J, and Greening. L *

Hartpury University, Gloucester, GL19 3BE, UK

Keywords: Rider weight; Horse-rider relationship; Suitably mounted; Social Licence to Operate

Introduction: Riding schools are crucial in introducing individuals to the equine industry, shaping their future interactions with horses. To safeguard the welfare of riding school horses/ponies, and novice riders' safety, staff ensure they are suitably mounted. However, limited research exists on human/horse demographics in riding school populations (Nyberg et al., 2023). This retrospective cohort study analysed characteristics from UK-based riding schools from 2019 to 2023 (n=308,698), using data from EC Pro, an equestrian centre software. Designed to enable effective business management with online booking and integrated horse care, yard, and staff management systems, EC Pro records riding clients' details which must be updated biannually (EC Pro, 2024).

Material & Methods: Before analysis, EC Pro anonymised all data. The software requires riders to self-report demographic details for horse management (EC Pro, 2024). This study analysed registered riders' age, self-reported height, weight, and geographical region. Data included the nine English regions, Wales, Scotland, and Northern Ireland. Rider body mass index (BMI) was calculated using height (m) and weight (kg). Descriptive analysis reported the mean (\pm standard deviation) variables. Chi-square analyses examined regional differences (significance: $p < 0.05$).

Results: Mean rider age: 21 ± 9.2 years. Mean height: 1.46 ± 0.94 m. Mean weight: 47.8 ± 52.3 kg. Mean BMI: 21.0 ± 23.3 . Rider BMI classification: underweight (BMI: <18.5) 38.2%, healthy (BMI: $18.5-24.9$) 41.5%, overweight (BMI: $25-29.9$) 13.8%, obese (BMI: >30) 7.5%. Regional population distribution (shown in Figure 1) along with differences for variables ($P < 0.05$) possibly reflect socio-economic characteristics.

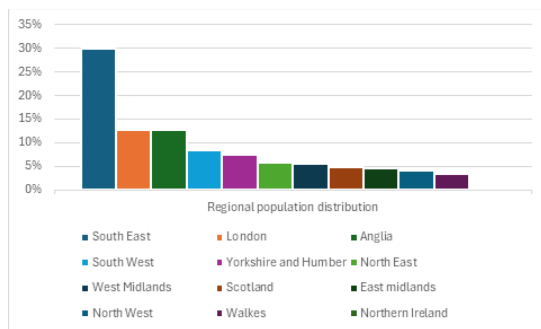


Figure 1: Bar Chart of the regional population distribution of UK riders attending riding schools.

Discussion & Conclusion: Utilising software like EC Pro aids in researching rider, horse, workload/type, and environmental factors, providing objective data for analysis. This informs optimal conditions for welfare and ensures suitably mounted combinations. With equestrianism under increased public scrutiny, objective evidence is crucial for obtaining a social license to operate, emphasising the importance of evidence-based practices in horse and rider interactions to safeguard equine welfare.

Recommended horse-rider weight ratio varies (10%, 15%, 20% of horse weight), aligning with most riding school riders' self-reported weights (Domino et al., 2022). However, limitations include a lack of recorded horse demographic information, rider sex, and potential inaccuracies in self-reporting. It is recommended to use these data, along with onsite rider measurements, to accurately assess riders for riding school horses/ponies, enhancing understanding of rider and horse demographics crucial for welfare, suitable mounting strategies, and resource allocation (Domino et al., 2022).

Acknowledgements: I extend my gratitude to EC Pro for their collaboration and data contribution, which was integral to this research. Special thanks to all individuals at EC Pro.

References:

Domino, M., Borowska, M., Trojakowska, A., Kozłowska, N., Zdrojkowski, Ł., Jasiński, T., Smyth, G., Maśko, M. (2022) 'The Effect of Rider:Horse Bodyweight Ratio on the Superficial Body Temperature of Horse's Thoracolumbar Region Evaluated by Advanced Thermal Image Processing.' *Animals* 12(2), p.195.

EC Pro: Equestrian Centre Management System (no date) EC Pro | Equestrian Centre Management System. Available at: <https://ecpro.co.uk/en> (Accessed: 06 April 2024).

Nyberg, L., Linnavalli, T., Hartmann, E., Kalland, M. (2023) Finnish and Swedish riding school pupils' motivation towards participation in non-riding education. *Frontiers in sports and active living*, 5, p.1232428

EFFECT OF POLE DISTANCE ON SPINAL KINEMATICS AT WALK

Maddock, C, Douglas, L., Walker, V.*

Hartpury University, Gloucester, GL19 3BE

Key words: polework, thoracolumbar, equine, rehabilitation

Introduction: In-hand walking over ground poles is effective for increasing activation of rectus abdominus (RA) and longissimus dorsi (LD) muscles (Shaw et al., 2021), as well as increasing fore/hindlimb range of motion (ROM) via flexion (Walker et al., 2022). Increases in differential ROM of the thoracolumbosacral spine have been observed whilst walking over poles (MacKechnie-Guire et al., 2022), however there is limited information on spinal kinematics when walking over poles at different distances. The study aimed to quantify thoracolumbar kinematics whilst walking over poles at three different distances compared to no poles.

Material & Methods: Six horses (mean±SD: height: 168±8cm, age: 9±3years), were recruited. Retroreflective skin-based markers (19 mm) were applied over thoracic (T)6, T10, T13, T15, T17, and lumbar (L)1, L3, L5, vertebrae, between tubera sacrale, and on left/right tubera coxae. Ten optical motion cameras (240Hz) captured horses walking in-hand on a straight-line track (26x1.8m). Three passes were collected at four different conditions: no poles (NP), five ground poles (10cm) set at 85%, 100% and 105% of step length (SL). Step length (100%) was obtained by measuring the distance between forelimb footfalls during the NP condition. Speed was controlled within 0.2m/s for NP but not for pole trials. Maximum flexion, extension and ROM of each vertebra was calculated in Matlab (v2024) using previously published methods (Faber et al., 2001). Differences between conditions were tested using repeated measures ANOVA with post hoc Bonferroni correction ($P \leq 0.05$).

Results: Compared to NP, in-hand walking over ground poles at 100% and 105% of SL increases ROM of T10 via extension. Increased maximal extension was seen at T13 and T15 at 100% and 105% of SL but did not significantly alter ROM. Poles set at 85% of SL decreased T10 extension but decreased L4 flexion. At 105%, L2 extension increased ($P < 0.027$ for all) (Figure 1).

Walking over poles at 85% of SL decreased ROM at T10, T13, T15, compared to 100% and 105%. At T13, and T15 this was due to a reduction in maximal extension, but no changes in extension were observed at T10. At T18, decreased ROM, via reduced extension, was observed at 85% of SL compared to 105% only. A reduction in maximal extension of L2 was seen at 85% compared to 105% of SL, but ROM was not significantly altered ($P < 0.030$ for all) (Figure 1).

Discussion: In this population, in-hand walking over ground poles increases thoracic mobility and this appears to be facilitated via increased thoracic extension. If increasing thoracolumbar extension is undesirable, shortening pole spacing may be advantageous. Neither walking over poles nor changing pole distance affected lumbar ROM. The pole distance selected may also impact limb kinematics, so this should be considered during exercise selection, and evaluated in further work.

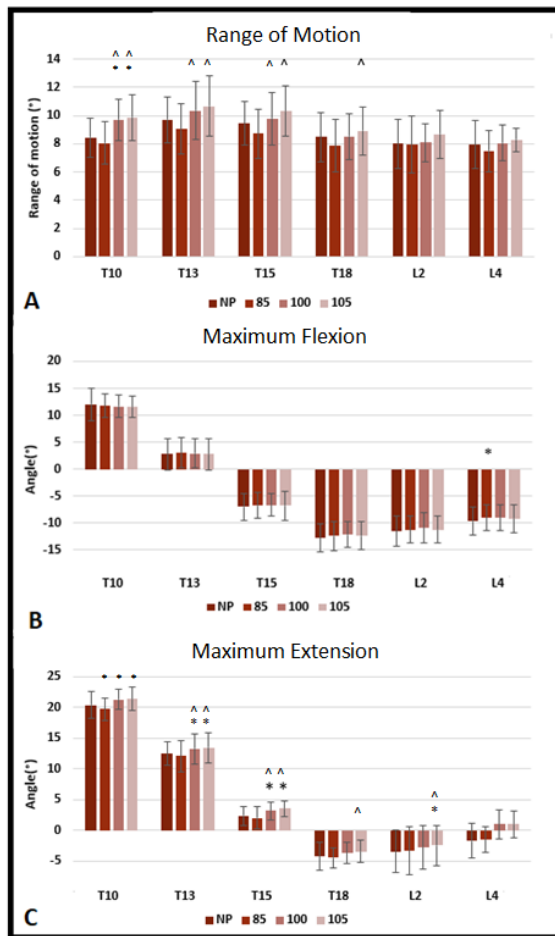


Figure 1: Flexion (B), extension (C) and range of motion (A) values (°) for T10, T13, T15, T18, L2 and L4 during each pole condition; no poles (NP), poles spaced at 85%, 100% and 105% of step length. Significance in comparison to NP (*) and significance in comparison to poles distanced at 85% of step length (^) is indicated.

References:

MacKechnie-Guire, R., Bealby, A., Fairfax, V., Berner, D., Pfau, T. 2022. ‘Do ground and raised poles affect differential rotational movement of the equine thoracolumbosacral spine during straight line locomotion when walking in-hand?’ *Equine Veterinary Journal*. 54 (S57), p.14

Shaw, K., Ursini, T., Levine, D., Richards, J. and Adair, S., 2021. ‘The effect of ground poles and elastic resistance bands on longissimus dorsi and rectus abdominus muscle activity during equine walk and trot.’ *Journal of Equine Veterinary Science*, 107, p.103772.

Walker, V., Tranquille, C., MacKechnie-Guire, R., Spear, J., Newton, R., Murray, R., 2022. ‘Effect of ground and raised poles on kinematics of the walk’, *Journal of Equine Veterinary Science*, 115, pp. 104-105.

PREDICTION OF RECTAL TEMPERATURE USING INFRARED THERMOGRAPHY IN HOLSTEIN DAIRY COWS

Mohan, R* and Evans, B

Hartpury University, Department of Animal Science, Hartpury, Gloucester, GL19 3BE

Introduction: The use of a rectal thermometer is the most common method of recording body temperature in dairy cows in field conditions. It is invasive, time-consuming, labour-demanding, a source of pathogen spread, and non-compliant with the requirements of present-day precision and welfare farming (Tao et al., 2021). The current work aimed to find the correlation between the thermographic temperature of different regions of interest (ROI) and rectal temperature (RT) in in-field Holstein cows. The secondary aim of the study was to find the ease of use (EoU) of an infrared thermographic camera at different ROI.

Materials and methods: Forty- two randomly selected Holstein dairy cows from Hartpury University Home Dairy Farm were recruited to collect RT and maximum and average infrared thermographic (IRT) temperatures of the eye region, muzzle, ear base (EB), tail base (TB), and vulva. RT was measured using a digital veterinary thermometer while the PK-80 camera (SATIR Europe (Ireland) Co. Ltd.) was employed to take thermographic temperatures of ROI. To avoid the influence of the anxious response of RT on thermographic measurements, the latter preceded the RT collection. Fridman's ANOVA and Spearman's correlation were used to find the significance of difference between means and to find the correlation respectively.

Results: In the comparison of means, the thermographic temperatures of all ROIs were significantly different from each other and lower than RT. Among all ROI temperatures, eye temperature was the highest, most consistent, and numerically closest to RT. Furthermore, the maximum eye temperature was more consistent than the average eye temperature. In the EoU score TB was significantly the highest but at the same time was most dispersed. None of the IRT temperatures registered a significant correlation with the RT.

Discussion: As the maximum IRT temperature of the eye region was the highest and most consistent among all the IRT temperatures it is suggested as an area for further research. Although TB offered most EoU, due to its highest dispersion it is unreliable for taking IRT readings, whereas eye temperature was second highest in EoU score, most consistent, and numerically closest to RT. Consequently, the eye region is suggested as the preferred site for recording IRT temperature in these animals. In Spearman's correlation, no significant correlation was found between any of the thermographic temperatures and RT, and the influence of environmental factors, poor camera quality, and lack of longitudinal study design could have contributed to such a finding (Jansson et al., 2021; Stukelj, Hajdinjak, and Pusnik, 2022). It is therefore suggested that at this stage infrared thermographic temperatures cannot be used to predict body temperature in these animals in field conditions. Future work might look to overcome the present limitations by designing a longitudinal study, switching off any fans before obtaining IRT readings, adding precision to camera position, and employing high-quality thermal cameras.

References:

Jansson, A. et al. (2021) 'An investigation into factors influencing basal eye temperature in the domestic horse (*Equus caballus*) when measured using infrared thermography in field conditions', *Physiology and Behavior*, 228, p. 113218. Available at: <https://doi.org/10.1016/j.physbeh.2020.113218>

Stukelj, M., Hajdinjak, M. and Pusnik, I. (2022) 'Stress-free measurement of body temperature of pigs by using thermal imaging – Useful fact or wishful thinking', *Computers and Electronics in Agriculture*, 193, p. 106656. Available at: <https://doi.org/10.1016/j.compag.2021.106656>

Tao, W. et al. (2021) 'Review of the internet of things communication technologies in smart agriculture and challenges', *Computers and Electronics in Agriculture*, 189, p. 106352. Available at: <https://doi.org/10.1016/j.compag.2021.106352>

PERCEIVED AND RECEIVED SOCIAL SUPPORT FUNCTIONS AMONG UEFA B LICENSED WOMEN FOOTBALL COACHES

Norris, L.

Hartpury University, Gloucester GL19 3BE

Abstract: Literature that focuses on women coaches indicates frequent experiences of difficult social environments in the coaching community. Individuals who are more socially integrated and satisfied with their social network are likely to overcome these demanding situations more effectively and have higher levels of well-being. Therefore, this study explored perceived and received social support functions among UEFA B licensed women football coaches. An exploratory, multiple case study approach was used to collect data from three white British women football coaches (*Age*= 26.6 years, *SD* = 1.2 years, *Experience*= 7.6 years, *SD* = 3.7 years). Each coach engaged in two semi-structured interviews that were conducted three or four months apart. We analysed the interview data using abductive thematic analysis. The coaches reported receiving social support that they perceived as unhelpful such as a tutor giving them easier drills to coach on coaching courses. However, they also received positive exchanges of social support resources (e.g., emotional support or providing a lift to coaching), which predominantly came from friends and family. The women coaches generally felt supported by the social networks that they had access to. However, there was an overall perception that the coaches would like support to be more easily accessible (e.g., via formal coaching networks). Given the pertinence of social support functions for performance and psychological well-being, applied implications that aim to better support women coaches are discussed.

Reference:

Norris, L. A., Didymus, F. F., & Kaiseler, M. (2024). 'Perceived and received social support functions among UEFA B licensed women football coaches.' *International Journal of Sport and Exercise Psychology*. pp.1-20
<https://doi.org/10.1080/1612197X.2024.231519>



UNDERGRADUATE STUDENTS' PERCEPTIONS OF A PROBLEM-BASED LEARNING BIOMECHANICS MODULE

Laurence Protheroe¹, Luciana De Martin Silva¹ and Celeste Wilkins²

Department of Sport, Hartpury University, Gloucester, UK¹

Sport Performance Lab, Maple Leaf Sports and Entertainment, Toronto, Canada²

The purpose of this study was to explore student perceptions of problem-based learning and provide recommendations for practice. Five students enrolled on a 2nd year sports biomechanics module at a UK institution participated in semi-structured focus groups at the mid- and endpoints of the module. Thematic analysis, with an inductive focus, identified themes related to successes, challenges and recommendations. Successes included intellectual development, teamwork and inclusivity. Challenges included uncertainty, engagement and retreat in intellectual development. Recommendations were integration of some traditional methods and choice of assessed problems. Educators can be confident that problem-based approaches can develop desired skills for practice but should be conscious of their students' stage of intellectual development.

AN INVESTIGATION INTO CANINE OWNERS' KNOWLEDGE OF BRUCELLA CANIS IN THE UK IN 2023

Shambrook, M.L

Hartpury University, Gloucester, GL19 3BE

Keywords: Zoonotic disease; canine welfare; veterinary practice; disease prevalence

Introduction: *Brucella canis* (BC), an infectious zoonotic bacterium, poses a growing threat to UK disease biosecurity. This threat is particularly concerning due to the annual increase in dog imports from outside the UK, which has led to a rise in prevalence of BC within UK veterinary practices. In recent years, there has been a concerning increase in BC infections among both canines and humans, with 2023 alone confirming 221 canine and two human cases of BC infections in the UK. Symptoms in humans can include swollen liver, spontaneous abortions, swollen lymph nodes, or infection may be asymptomatic, and canine symptoms include spontaneous abortions, pyrexia, discospondylitis, infertility, neurological dysfunction or they may be asymptomatic. Due to the low efficacy of antibiotics in eradicating BC, euthanasia is often the primary method of BC treatment and prevention. Previously published scientific literature and government risk assessments highlight a lack of public knowledge regarding BC; examining how this knowledge gap may influence the prevalence of BC in veterinary clinics. This study assessed UK canine owners' awareness of BC and explored whether owner education could improve their ability to recognise and identify BC.

Materials and Methods: Data were collected through an online questionnaire comprising multiple-choice, true or false and rating scale questions before and after access to an informational factsheet about BC; subsequently assessing and improving owner knowledge of BC. Inclusion criteria stipulated participants must be over 18, live in the UK and currently own a dog. Social media was used to recruit 134 canine owners using convenience, snowball and self-selection sampling. Data were analysed via descriptive statistics and inferential statistical tests including Mann-Whitney U and Wilcoxon.

Results: The Mann-Whitney U test showed no significant difference in BC knowledge between UK-bred and European-bred dog owners ($P=0.667$), demonstrating a trend of low scores and a universal lack of BC knowledge. Only 9% of study participants reported that their European rescue centre mentioned BC; demonstrating insufficient discussions between rescue centres and owners, highlighting the need for rescue centres to improve education surrounding BC before canine importation. The Wilcoxon test showed a significant increase in participant knowledge from pre- to post- educational factsheet test scores ($P<.001$) and the pre- to post-factsheet confidence ratings ($P<.001$); demonstrating that owner education significantly improved participant understanding and confidence in educating others about BC.

Discussion: The overall findings indicate a universal lack of BC knowledge among all participants, evidencing that owner education is needed to improve canine welfare and worldwide biosecurity. Analysis indicated that providing owner education significantly increased participant BC understanding and that European-rescue centres are infrequently discussing BC risks with potential owners. These results underscore the importance of educating owners on the BC risks posed to canines and humans, providing veterinary professionals and canine rescue-centres with valuable insights into the impact of owner education on this zoonotic disease. Conducting additional research into information disseminated by canine rescue organisations in BC endemic regions could contribute further to addressing the root causes of insufficient owner awareness surrounding BC.

ESTABLISHING A PROTOCOL TO IDENTIFY MARKERS OF POSTURAL CONTROL USING A RIDING SIMULATOR – A PILOT STUDY

Stemper, M.^a, Nankervis K.^a, Draper, S.^a, Mills, R.^b, Hodson-Tole, E.^b and Wilkins, C.A.^a

^aHartpury University, Gloucester, GL19 3BE

^bManchester Metropolitan University, Manchester, M1 7EL

Key words: Hippotherapy; Postural control; Riding simulator; Motor impairments

Introduction: Although the seated position is the one most frequently used during activities of daily living in patients with motor impairments, only a few studies have evaluated postural control in the seated position (Cherng, Lin, Ju, and Ho, 2009; Liao et al., 2003). A small number of studies have started investigating the kinematic responses to perturbations in seated, and sitting astride positions (Tabsuri et al., 2021, Trabelsi et al., 2019, Shurtleff et al., 2010), with the majority of these looking at post intervention changes. While hippotherapy (HT) has shown promise in improving motor functions and balance in children with motor impairments, research on the specific postural control strategies during HT is limited. However, to fully understand the potential effect, task demand and adaptation of children with motor impairment to the 3D simulated movement of a horse, it is imperative to develop a protocol to assess this. This pilot study aims to develop a protocol for assessing parameters of postural control using a riding simulator. A second aim was to assess the reliability of the developed protocol.

Materials & methods: Using the Racewood eventing simulator, seven healthy adults (1=male) with and without riding experience took part in a series of trials at three different walking speeds. The simulator operated at frequencies of 1.23 Hz, 1.36 Hz, and 1.31 Hz for collected, medium, and extended walk, respectively. Motion capture data was gathered and analysed to identify joint angles and postural stabilization strategies using the Qualisys system. Participants underwent a warm-up period followed by randomly assigned trials with varying walking speeds. All data was analysed using Visual3D and MATLAB.

Results: All participants showed similar and consistent torso and pelvis joint angle patterns relative to the simulator movement across all frequencies and trials (ICC 0.995), and all planes (transverse, sagittal, horizontal) during a steady state phase of each frequency. Head joint angles relative to the movement of the torso, were more varied, however anchoring indices across participants were still between 0-1 indicating a head stabilized in space strategy (HSSS). Collected walk showed the lowest, most neutral stabilization strategy, while medium and extended walk had higher anchoring indices.

Discussion: The developed protocol demonstrates good reliability measuring a variety of postural control parameters. It can therefore provide a foundation for future studies to explore postural adaptations in children with motor impairments during HT specific tasks. Understanding these adaptations will be crucial for optimizing therapeutic interventions in children with motor impairments in the future.

Acknowledgements: We acknowledge the Hartpury University ethics committee for their approval and support of this study.

References:

Cherng, R., Liao, H., Leung, H., and Hwang, A. (2004). 'The Effectiveness of Therapeutic Horseback Riding in Children With Spastic Cerebral Palsy.' *Adapted Physical Activity Quarterly*. 21, pp.103-121.

Liao, S., Yang, T., Hsu, T., Chan, R., and Wei, T. (2003) 'Differences in Seated Postural Control in Children with Spastic Cerebral Palsy and Children Who Are Typically Developing.' *American Journal of Physical Medicine & Rehabilitation* 82(8), pp.622-626

Shurtleff, T. L., and Engsborg, J. R. (2010). 'Changes in Trunk and Head Stability in Children with Cerebral Palsy after Hippotherapy: A Pilot Study.' *Physical & Occupational Therapy In Pediatrics*, 30(2), pp.150–163.



HARTPURY
UNIVERSITY

Tabhuri, T., Thawinchai, N., Peansukmanee, S., and Lugade, V. (2021) 'Trunk and pelvis biomechanical responses in children with cerebral palsy and with typical development during horseback riding.' *Gait and Posture*, 89, pp.115–119.

Trabelsi, I., Hérault, R., Baillet, H., Thouvarecq, R., Seifert, L., and Gasso, G. (2022) 'Identifying patterns in trunk/head/elbow changes of riders and non-riders: A cluster analysis approach.' *Computers in Biology and Medicine*, 143, pp.105193

QUALITY OF CARE ADVICE GIVEN TO FIRST TIME CORN SNAKE (*PANTHEROPHIS GUTTATUS*) OWNERS

Tedds, H. L. ^a, Sneddon, S. ^b, Clubb, R. ^c, Ollerton, J. ^b, and McCormick, W.D. ^a

^a Hartpury University, Gloucester, GL19 3BE, UK.

^b University of Northampton, University Dr, Northampton NN1 5PH.

^c RSPCA, Chart Way, Horsham RH12 1GY.

Keywords: Reptile welfare; pet trade; animal husbandry advice.

Introduction: Over the past two decades there has been a large increase in keeping snakes as pets. Pet Food UK (2024) estimated that there are currently 600,000 pet snakes in the UK, with 1.3% of households having one. Compared with domestic species such as cats and dogs, knowledge and peer-reviewed scientific research surrounding snakes' complex biological needs is limited. This, along with limited specialist veterinary services, can cause an over-reliance on 'folk' husbandry whereby anecdotal knowledge is shared between owners, and there are conflicting ideas on how best to keep snakes. Vets report seeing reptiles with health issues that are often because of poor husbandry which tends to be caused by novice owners. Previous research by the RSPCA (2018) highlighted that novice reptile owners trust care advice given by vendors (e.g. pet shops) above all other sources of information, although there is limited data available on what this advice looks like. Given the conflicting information circulating on care needs, are pet shops giving consistent care advice that is based on current, best practice guidelines? The aim of this study was therefore to investigate what care advice is available to novice owners for the UK's most commonly kept snake species, the corn snake (*Pantherophis guttatus*), when visiting licensed pet shops.

Methods: Using a covert mystery shopper model, 41 pet shops were surveyed to record the care advice given when enquiring with 10 questions based around the care of corn snakes. Advice given was then compared with RSPCA care guidelines as a benchmark and scored to determine how similar or different this was, and where there were mixed answers between shops on the same topic. Chi-squared goodness-of-fit tests with p-values of >0.05 highlighted where there was variation in care advice between shops and p-values of <0.05 highlighted where there was conflicting advice compared with the RSPCA guidelines.

Results: Shops had conflicting advice on whether the provision of UVb lighting was needed ($p=0.001$), with only 7% agreeing with RSPCA guidelines on this. Shops also had conflicting advice on the recommended length of vivarium needed ($p=0.001$), with only 2% agreeing with RSPCA guidelines that this should be >150cm, which would be long enough for an adult corn snake to fully stretch out. When asked if it would be best to register a new pet corn snake with a veterinary practice, 73% said no, which also conflicts with RSPCA guidelines ($p=0.011$). Of the 27% of shops that recommended registering, there was variation in advice on whether a specialist reptile veterinarian would need to be sought ($p=0.876$). Variation in advice was also given on whether a thermostat should be used to control heating equipment ($p=0.639$) and whether corn snakes can be aggressive towards their owners ($p=0.078$).

Discussion: This research highlights several areas where further empirical research is needed to address gaps in knowledge and care advice to safeguard reptile welfare, with clarity needed specifically on the provision of UVb lighting and enclosure dimensions.

References:

Pet Food UK (2024) UK Pet Population 2024 (online) Available from: <https://www.ukpetfood.org/information-centre/statistics/uk-pet-population.html> (Accessed 23rd May 2024).

RSPCA (2018) Understanding the motivations of beginner reptile owners (online) Available from: <https://www.rspca.org.uk/webContent/staticImages/Downloads/ReptileReport.pdf> (Accessed 13th January 2023).

EFFECT OF DIFFERENT LIGHT REGIMES ON SLEEPING BEHAVIOUR OF PAIR-HOUSED PIGS

Teixeira, D.^a; Soldevila, M.^a; Duggan, N.^a; Boyle, L.^b

^a Hartpury University, Department of Animal and Agriculture, Gloucester, GL19 3BE, UK

^b TEAGASC, Pig Development Department, Fermoy, Ireland

Keywords: sleep pattern; piglets; social behaviour

Introduction: Intensification of animal production systems is likely to prevent livestock from obtaining adequate sleep patterns through different factors such as disturbances from pen -mates and stockpersons, artificial lights, feeding times, bedding material, air quality and ammonia concentrations. However, little is known about the influence of modern intensive production systems on livestock sleep behaviour and how sleep deprivation can affect their welfare. Human sleep patterns are associated with stress and subsequent sleep disturbances, and this is likely to be similar in other sleeping mammals, such as pigs. Studying changes in sleep pattern could help us to understand how animals respond to their environment and the occurrence of aggressive and abnormal behaviours. Therefore, the aim of this study was to evaluate the effect of different light regimes on the sleeping behaviour of piglets.

Materials and methods: The study was conducted at the PIG BioTest Facility at TEAGASC (Ireland), using 32 pairs of weaned pigs from 5 to 10 weeks old housed in one of 4 rooms. All rooms had lighting at an intensity of 400 lux. Two rooms had lighting provided for a period of 8 hours/day (T8) and two rooms had lighting provided for a period of 16 hours/day (T16). T16 was used as the control group and was exposed to the regular light seen in research and on commercial farms, receiving light from 6.00h to 22.00h, and 8h hours of darkness. T8 received light from 9.00h to 17.00h, and 16h of darkness, which was the minimum amount of light legally required. Pig weights were taken from birth, at the start of the trial and finally at the end of trial. Pig behaviour was continuously recorded on days 1, 2, 3, 8, 15 and 22 of the study. From the 24h of recording of these days, each hour was assigned an interval with 6 instantaneous scans each (minute points: .00, .10, .20, .30, .40, .50). The posture, behaviour and position within the pen was therefore noted every 10 minutes, to assess the posture frequency, sleep, social behaviour, and usage of space.

Results: Preliminary findings indicate that the light regime did not affect pig weights. Analysis of video recordings is still in process.

Acknowledgement: The authors acknowledge Hartpury Research and Knowledge Exchange for the Internal Research Grant 2023-2024.

EFFECT OF WATER TROUGH LOCATION AND SOCIAL RANK ON THE DRINKING BEHAVIOUR OF DAIRY COWS

Weerasinghe, S.^a, Adebayo, A.^b, Bell, M.^a, Teixeira, D.^a

^a Hartpury University, Department of Animal and Agriculture, Gloucester, UK

^b University of the West of England (UWE), Bristol, UK

Keywords: water supply, dairy cattle, consumption, position

Introduction: Designing better management strategies when offering water for dairy cows can guarantee that animals from different position in the social rank can have access to the fresh water and ingest it according to their needs. The objective of this study was to evaluate the association between social hierarchy, milk yield, drinking behaviour (frequency, duration) and water intake of dairy cows when they have access to three water troughs positioned in different locations (one at each end and one in the middle of cubicle housing) in a rectangular free-stall barn system. The hypothesis was that dominant cows would drink more often from the trough positioned close to the area where the herd spent more time.

Materials and methods: The study was conducted at Hartpury University Farm using 59 first lactation Holstein Friesian cows over a two-month period. The characteristics of the three water troughs used in the research were: A and B: 330 l, 1.8 m length, 0.42 m width, 0.40 m depth; C: 190 l, 1.8 m length, 0.42 m width, 0.20 m depth. The Agonistic Success Index was used to calculate dominance from agonistic interactions; water intake and milk yield were obtained from the farm records; camera traps and direct behaviour observations were used to record the frequency and duration of drinking at each water trough. Descriptive statistics from the first 11 days of data collection are presented.

Results: Preliminary data showed that 15 cows were considered high-ranking animals (index of displacements above 0.6), 25 were considered middle-ranking animals (index between 0.4 and 0.6) and 23 were considered low ranking animals (index of displacements below 0.4). Social rank does not seem to be associated with milk yield (high-ranking: 30.2 l/day; middle-rank: 29.7 l; low-rank: 31.6 l). Personal observations seemed to indicate that the social rank of cows did not influence preference to drink from a specific water trough, but it suggested that cows preferred drinking more often from the smaller trough positioned at the end of the stalls (trough C).

Discussion: Our preliminary findings could suggest that the location of the water trough plays a more important role in drinking behaviour of dairy cows than their social rank, however, further data collection and statistical analysis are needed to confirm such suggestions. Addressing these correlations will help to improve the water supply for dairy cows to ensure equal welfare standards across the herd.

Acknowledgement: The authors acknowledge the MRes research project bursary that the first author received from Hartpury University (RKE).

HOW DOES WALKING AND TROTTING OVER GROUND AND RAISED POLES ALTER THE SPINAL KINEMATICS OF THE HORSE?

Walker, V^a., MacKechnie-Guire, R^a., Deckers, I^a., te Moller, N.C.R.^b., Tabor, G^a., Winfield, J^a., Maddock, C^a.

^aHartpury University, Gloucester, GL19 3BE, UK

^bUtrecht University, Utrecht, 3584 CM, The Netherlands

Keywords: thoracolumbosacral, equine, locomotion, rehabilitation

Introduction: Polework exercise is used as part of equine training and rehabilitation programmes and has been demonstrated to increase limb range of motion (ROM) and the differential ROM of the thoracolumbar spine during in-hand walking and when ridden in trot (MacKechnie-Guire et al., 2022). No information exists on how this change in thoracolumbar ROM is achieved i.e., increased flexion/extension or both, which is relevant for exercise selection. Trotting over ground poles increases muscle activation of the rectus abdominis (Shaw et al., 2022) and multifidus (Ursini et al., 2022), both contributing to spinal motion and stability; however, there is limited information on the kinematics of the spine whilst trotting in-hand over ground and raised poles. The study aimed to quantify thoracolumbar (TL) kinematics whilst trotting in-hand over five ground (GP) and five raised poles (RP) compared with trotting over no poles.

Materials and Methods: Thirty-two mixed breed horses (Mean±S.D, height: 152.0±20.9cm, age: 11.4±5.0years) were recruited. All horses underwent a straight-line veterinary and physiotherapy assessment and were <1/5 on the AAEP scale with no superficial muscle pain. Skin markers (19mm) were applied to thoracic (T)6, T10, T13, T15, T17, and lumbar (L)1, L3, L5 vertebrae, and between left/right tubera sacrale. Ten optical motion cameras (Qualysis, AB, 240 Hz) captured two to four straight-line passes through an experimental track (26x1.8m) for no poles (baseline), five ground poles (10cm), and five raised poles (26cm). Pole distances were matched to 100% of the horses' forelimb step length during no poles. For baseline measurements between trial speed was controlled at <0.2m/s. TL flexion-extension (min/max/ROM) was calculated using previously published methods (Matlab v.2024a). All analysis was carried out in SPSS. A Shapiro-Wilk test determined normality and then a repeated measure ANOVA/Friedmans was used. Significance was set at P<0.05. A Bonferroni correction was applied and adjusted p values are presented.

Results: Trotting in-hand over poles increased FE ROM at T10, T13, T15, T18, L2, L4 (Table 1). For all locations, except L4, there was increase in maximal TL extension over GP and RP compared to no poles, but this was greater in magnitude over RP compared to GP at T10, T13, T15. For L4 increased extension was seen over RP only compared to no poles. Increases in maximal flexion were seen over poles (GP+RP) for T10, T13 and T15.

Table 1: Mean and standard deviation of maximal flexion and extension angles and range of motion (ROM) for measured thoracolumbar locations for no poles (NP), ground poles (GP), and raised poles (RP). Calculated using Faber et al., 2000. Bonferroni correction adjusted significant p values. Significant variables seen in bold.

Variable	Condition			ANOVA/KW	Post hoc		
	NP (°)	GP (°)	RP (°)		NP v GP	NP v RP	GP v RP
T10_Flexion	14.28±2.92	12.61±3.04	12.65±3.66	<0.001	<0.001	<0.001	1.000
T10_Extension	18.64±2.81	19.68±2.91	21.20±3.21	<0.001	0.008	<0.001	<0.001
T10_ROM	4.35±1.21	7.06±1.88	8.55±2.63	<0.001	<0.001	<0.001	<0.001
T13_Flexion	9.05±3.30	7.99±3.20	7.38±3.68	<0.001	<0.001	<0.001	0.062
T13_Extension	12.76±3.07	14.25±3.23	15.18±3.90	<0.001	<0.001	<0.001	0.006
T13_ROM	3.71±1.49	6.26±1.96	7.80±2.89	<0.001	<0.001	<0.001	<0.001
T15_Flexion	-1.34±2.23	-1.86±2.13	-2.31±2.39	<0.001	0.022	<0.001	0.138
T15_Extension	1.29±2.07	2.63±2.24	3.26±2.68	<0.001	<0.001	<0.001	0.023
T15_ROM	2.63±1.38	4.49±1.84	5.57±2.20	<0.001	<0.001	<0.001	<0.001



T18_Flexion	-8.79±2.51	-9.08±2.35	-8.93±2.51	0.409			
T18_Extension	-5.86±2.27	-4.94±2.45	-4.53±2.86	<0.001	<0.001	<0.001	0.328
T18_ROM	2.93±1.35	4.14±1.90	4.40±1.42	<0.001	<0.001	<0.001	0.054
L2_Flexion	-10.41±2.59	-10.36±2.02	-10.21±2.19	0.513			
L2_Extension	-6.93±2.65	-6.02±2.88	-5.66±2.65	<0.001	<0.001	<0.001	0.128
L2_ROM	3.47±1.41	4.35±2.37	4.56±1.71	0.025	0.002	<0.001	0.151
L4_Flexion	-10.35±2.61	-9.94±2.49	-10.01±2.81	0.249			
L4_Extension	-5.84±2.57	-5.02±2.70	-4.23±3.01	<0.001	0.004	<0.001	0.006
L4_ROM	4.52±1.31	4.93±1.75	5.77±2.22	<0.001	0.303	0.001	0.005

Discussion: In this group of horses, trotting over poles at 100% of their step length increased thoracolumbar FE ROM, predominantly through increased spinal extension. Increased flexion was found in the cranial thoracic spine for GP and RP. Trotting over GP and RP induces spinal mobility and there are instances where increases in spinal extension may not be desirable, which needs to be considered in the selection and application of pole work exercise within training and rehabilitation programmes.

References:

MacKechnie-Guire, R., Bealby, A., Fairfax, V., Berner, D., and Pfau, T (2022) 'Do ground and raised poles affect differential rotational movement of the equine thoracolumbosacral spine during straight line locomotion when ridden in sitting trot.' Equine Veterinary Journal. 54 (S57), pp.13-14

MacKechnie-Guire, R., Bealby, A., Fairfax, V., Berner, D., and Pfau, T. (2022) 'Do ground and raised poles affect differential rotational movement of the equine thoracolumbosacral spine during straight line locomotion when walking in-hand?' Equine Veterinary Journal. 54 (S57), p.14

Shaw, K., Ursini, T., Levine, D., Richards, J. and Adair, S. (2021) 'The effect of ground poles and elastic resistance bands on longissimus dorsi and rectus abdominus muscle activity during equine walk and trot.' Journal of Equine Veterinary Science, 107, p.103772.

Ursini, T., Shaw, K., Levine, D., Richards, J. and Adair, H.S., 2022. Electromyography of the multifidus muscle in horses trotting during therapeutic exercises. Frontiers in Veterinary Science, 9, p.844776.

EFFECT OF EXERCISE MODALITIES ON EQUINE KINEMATICS AND THEIR APPLICATION TO TRAINING AND REHABILITATION

Walker, V, MacKechnie-Guire, R., Nankervis, K., Parker, J., Tabor, G.*

Hartpury University, Gloucester, GL19 3BE, UK

Keywords: Pessoa Training Aid, polework, water treadmill, horse,

Introduction: During training and rehabilitation, exercises are frequently conducted with the aim of influencing the locomotor pattern of the horse. Various modalities such as training aids, polework, dry and water treadmills are commonly employed for this purpose; however, there is limited evidence of their effect on equine kinematics. The aim of this body of work was to investigate the effect of a Pessoa Training Aid, walking over poles, and walking in a water treadmill on equine trunk and limb kinematics. The accompanying thesis provided a critical commentary of this process.

Materials and Methods: Equine participants were acclimatised to the use of the modalities as part of inclusion criteria and had a lameness grade of $\leq 1/5$ on the AAEP scale. A combination of high-speed videography (125/240 Hz), optical motion capture (240 Hz), limb and upper body inertial measurement units (104/60 Hz) was used to quantify limb and trunk kinematics in four experiments: 1. Lunging at trot with and without a Pessoa Training Aid, 2. Walking over ground and raised poles 3. Walking in a water treadmill from dry to 47cm depth water 4. Post water treadmill exercise.

Results: Compared with a baseline of no intervention, the modalities induced kinematic changes. The application of the Pessoa Training Aid resulted in a decrease in speed, stride length, lumbosacral angle at maximum hindlimb retraction and subjective evaluation identified an increase in dorsoventral displacement of the mid back, and in grade of 'overall way of going' based on British Dressage scoring. Walking over poles increased fore and hind limb range of motion, via increased swing phase flexion, compared to overground walking. This effect increased from ground poles to raised poles and only raised poles increased shoulder range of motion (ROM). Upper body kinematics indicated that the horse may use its head to balance over raised poles, as observed by increased craniocaudal ROM of the head and that mediolateral trunk motion increased over raised poles. Limb and flexion-extension ROM of the thoracic spine increased with water depth, whilst walking in water. Increased mediolateral ROM of the pelvis was observed with increased water depth, coinciding with peak hock flexion. This has some similarities with the findings over poles and together these findings suggest that increased mediolateral pelvic ROM may be a strategy to facilitate limb elevation, this is indicated for further work. Post water walking horses had a decrease in hindlimb fetlock extension at midstance and an increase in subjectively assessed hock oscillation.

Discussion: The study outcomes and the critical commentary can support decision -making to determine if the application of a given modality is warranted for a specific individual in relation to its training and/or rehabilitation goals. The studies suggest that pole work and water treadmill exercise are useful for increasing limb range of motion, but the action of the treadmill belt and the induction of increased limb retraction may influence the suitability of one over the other depending on the needs of the horse. Caution should be applied when extrapolating the findings determined in non-lame horses to horses undergoing rehabilitation.

Acknowledgements: The authors of the published studies would like to thank the PetPlan Charitable Trust, British Dressage, Christian Landolt and Dr. Wilfrid Bechtolsheimer for funding.

TRANSFORMING RETRAINING: SUPPORTING RACEHORSES TO HAVE SUCCESSFUL SECOND CAREERS.

Williams, J.M.^{a}, Nankervis, K.^a, Jordan, S.^a, Friend, L.^a, Edmunds, M.^a, Kay, E.^a, Williams, J.^b and Tabor, G.^a*

^a*Hartpury University, Gloucester, GL19 3BE, UK*

^b*Hong Kong Jockey Club, Hong Kong, China*

Keywords: Thoroughbred; former racehorse; off the track thoroughbred (OTTB); horseracing; equestrian.

Introduction: Following their racing career, retirement requires racehorses to adapt to a new lifestyle which requires considerable physical and mental adaptation from the horse. Identifying an optimal transition is paramount to maximize a good life beyond racing.

Materials and Methods: Global stakeholders (n=100) experienced in retraining racehorses completed an online survey to identify common themes and challenges of transition. The results informed a subsequent Delphi consultation with re-trainers, and musculoskeletal therapists (n=27) experienced in supporting racehorses to successful second careers. Participants were recruited through racing social media, industry contacts and snowball sampling. Survey data were analyzed using frequency analysis and conventional inductive content analysis. In addition, for the Delphi, content validity ratios determined consensus for behavioral, physical, exercise and management factors that should feature in transition.

Results: Survey respondents identified 4 themes key to successful retraining: 1) time, 2) people, 3) horse's history, and 4) approach. The Delphi identified seven areas essential to transition: feeding regime, the rider, the handler, type of exercises undertaken, assessing/changing the horse's shape, assessing/changing the horse's posture, and provision of turnout.

Discussion: The results should inform the development of objective, multidisciplinary team, evidence-informed pathways that can support re-trainers and future owners to facilitate suitable second careers for individual racehorses after transition.

Acknowledgements: We would like to extend our thanks to all respondents who participated in the survey and Delphi studies. We would also like to thank the Hong Kong Jockey Club Equine Welfare Research Foundation for funding this work



Thank you

We would like to take the opportunity to thank all those who have contributed to the running of conference and supported us today.

Volunteers:

Kirsty Lesniak
Lisa Williams
Carol Gray
Kev Harris
Lorna Cameron
Christine Cox
Lucy Grieve
Melanie Stemper
Marcus Palmer
Andrew Hearn
Wing Ng
Misbah Ahmad
Emily Kay
Tilly Parry
Christine Cox
Raf Baby
Luke Norris
Prajwal Gowda
Lucy Grieve
Karen Willis
Gemma Penhorwood

The Digital Services Team
The Marketing Team
IT Support
The Estates Team

**A big thank you to all of our presenters and to you for attending the Hartpury
Research and Knowledge Exchange Conference 2024.**

We hope to see you all next year.

Date for the diary 10 July 2025