9th International Equitation Science Conference

University of Delaware, Newark, DE, USA
& University of Pennsylvania, New Bolton Center,
Kennett Square, PA, USA

July 17th – 20th, 2013



CONFERENCE PROCEEDINGS

Theme: Embracing Science to Enhance Equine Welfare and Horse-Human Interactions

Edited by: Dr. Camie Heleski & Dr. Carissa Wickens

International Society for Equitation Science
www.equitationscience.com



Presents

9th International Equitation Science Conference

17th – 20th, 2013

University of Delaware & University of Pennsylvania,
New Bolton Center, USA

Embracing Science to Enhance Equine Welfare and Horse-Human Interactions

Proceedings Edited By:

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Dr. Carissa Wickens

Abstract Submission System – FASS (Federation of Animal Science Societies) www.fass-abstracts.org

Proceedings Production – University of Delaware Printing Services

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Printer Address:
University Printing Services
222 S. Chapel Street
Newark, DE 19716

First published, 2013

Photo, Front Cover – Taken by Christina Mascaro for Tatia Heleski

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WELCOME TO THE USA FOR THE 9TH ISES CONFERENCE



On behalf of the ISES USA local organizing committee and the University of Delaware and University of Pennsylvania, New Bolton Center, welcome to the Mid-Atlantic region! We are delighted the 9th International Society for Equitation Science Conference has returned to the USA in 2013. The Mid-Atlantic States are home to a vibrant and diversified equine industry with members of our equine community engaging in multiple levels and disciplines of equestrian sport and recreational riding. The region is home to many excellent equine training facilities and veterinary centers, and is host to several well-known and exciting equestrian events including Dressage at Devon, Fair Hill International CCI, Thoroughbred and Standardbred racing, polo matches, and much more.

For 2013, we will continue to focus on ways of improving horse training as well as to encourage the development of science-based criteria to measure the welfare of the horse in its interactions with humans. An additional theme for this year's conference will emphasize dissemination of equitation science research within our equine industries and to our students studying equine behavior and welfare.

We hope that in addition to enjoying the scientific, practical day and social programs, you will also take the opportunity to enjoy Main Street in Newark, the University of Delaware campus, and to venture into the beautiful Pennsylvania countryside.

Dr. Carissa Wickens – on behalf of the ISES USA 2013 Local Conference Organizing Committee

PRINCIPLES OF LEARNING THEORY IN EQUITATION

Does your training stand the test of science? The following 8 principles were originally defined in the peer-reviewed scientific literature (McGreevy and McLean, 2007 – The roles of learning theory and ethology in equitation. Journal of Veterinary Behavior: Clinical Applications and Research, Volume 2, 108-118). The application of these principles is not restricted to any single method of horse-training, and we do not expect that just one system will emerge. There are many possible systems of optimal horse-training that adhere to all of these principles.

FIRST PRINCIPLES IN HORSE-TRAINING

1. Understand and use learning theory appropriately Learning theory explains positive and negative reinforcement and how they work in establishing habitual responses to light, clear signals. (Note that "positive" and "negative" when applied to reinforcement are not value judgments, as in "good" or "bad", but arithmetical descriptions of whether the behavior is reinforced by having something added or something taken away, e.g., pressure. For example, when the horse responds to a turn signal and the rein pressure is immediately released, negative reinforcement has been applied.) It is critical in the training context that the horse's responses are correctly reinforced and that the animal is not subjected to continuous or relentless pressure. Prompt and correct reinforcement makes it more likely that the horse will respond in the same way in future. Learning theory explains how classical conditioning and habituation can be correctly used in horse-training.

2. To avoid confusion, train signals that are easy to discriminate There are many responses required in horse-training systems but only a limited number of areas on the horse's body to which unique signals can be delivered. From the horse's viewpoint, overlapping signal sites can be very confusing, so it is essential that signals are applied consistently in areas that are as isolated and separate from one another as possible.

3. Train and shape responses one-at-a-time (again, to avoid confusion) It is a prerequisite for effective learning that responses are trained one-at-a-time. To do this, each response must be broken down into its smallest possible components and then put together in a process called "shaping".

4. Train only one response per signal To avoid confusing the horse, it is essential that each signal elicits just one response. (However, there is no problem with a particular response being elicited by more than one signal.) Sometimes a response may be complex and consist of several trained elements. These should be shaped (or built up) progressively. For example, the "go forward" response is expected to include an immediate reaction to a light signal, a consistent rhythm as the animal moves in a straight line and with a particular head carriage. Each of these components should be added progressively within the whole learned response to a "go forward" signal.

5. For a habit to form effectively, a learned response must be an exact copy of the ones before For clarity, a complete sequence of responses must be offered by the horse within a consistent structure (e.g., transitions should be made within a defined number of footfalls). Habit formation applies to transitions in which the number of footfalls must be the same for each transition and this must be learned.

6. Train persistence of responses (self-carriage) It is a fundamental characteristic of ethical training systems that, once each response is elicited, the animal should maintain the behavior. The horse should not be subjected to continuing signals from leg (spur) or rein pressure.

7. Avoid and dissociate flight responses (because they resist extinction and trigger fear problems) When animals experience fear, all characteristics of the environment at the time (including any humans present) may become associated with the fear. It is well-known that fear responses do not fade as other responses do and that fearful animals tend not to trial new learned responses. It is essential to avoid causing fear during training.

8. Benchmark relaxation (to ensure the absence of conflict) Relaxation during training must be a top priority, so when conflict behaviors are observed in the horse, we must carefully examine and modify our training methods so that these behaviors are minimized and ultimately avoided. To recognize the importance of calmness in enabling effective learning and ethical training, any restraining equipment, such as nosebands, should be loose enough to allow conflict behaviors to be recognized and dealt with as they emerge.

A PRINTABLE PDF FORMAT POSTER OF THESE IS AVAILABLE AT http://www.equitationscience.com/learning-theory-in-equitation

PROGRAM

Wednesday 17 July 2013		
NAEAA (National Association of Equine Affiliated Academics) http://naeaa.com/webpage.html The NAEAA Mini-Conference will take place on the afternoon of July 17th in advance of the opening reception for the International Society for Equitation Sciences (University of Delaware – Newark, Delaware). The NAEAA Conference will begin at midday on July 17th Admission to the NAEAA Conference is the price of becoming an NAEAA member - $35 http://naeaa.com/index.html Please RSVP with Tim Williams, twilliams@naeaa.com		
Session 1 **~1.00-2.15**	Who are our students? A look at data from incoming and graduating student surveys (US) conducted through NAEAA - followed by moderated discussion on what this data means to the Equine discipline in general and Equitation Science specifically.	National Association of Equine Affiliated Academics
Session 2 **~2.15-3.30**	Determining 'excellence' in equine academic offerings - with specific focus on Equitation offerings within the academy.	National Association of Equine Affiliated Academics
Session 3 **~3.30-4.45**	How is Equitation Science offered, integrated, and assessed in academic curricula?	National Association of Equine Affiliated Academics
6.30	**ISES Conference Welcome Reception –** **Welcome, Networking & Registration (light refreshments)**	

Thursday 18 July 2013 : Scientific Conference Day 1		
8.30 – 9.00	**Introduction, Conference Opening, Housekeeping** **Introduction of ISES Council Members & LCOC members**	C Heleski, C Wickens, A McLean, M Rodgers
	Session Chair – **Karen Waite (US)**	
9.00– 9.45	**Advancing evidence based practice and learning in equitation**	N Waran & H Randle (UK)
9.45- 10.00	Using models of legitimacy to build messages about Equitation Science	K Bump (US)
10.00 – 10.15	Sport psychological skills in jumping riders	Wolframm, E Ottersky (Netherlands)
10.15 – 10.30	Mirror, mirror on the wall… how horses serve as self-objects for their owners	Wolframm, R Krempe, H Mertens (Netherlands)
10.30 – 11.15	**Morning tea/coffee break & Posters (Poster Chair – Inga Wolframm (NL)** **EVEN NUMBERED POSTER PRESENTERS TO BE BY POSTERS**	
	Session Chair – **Andrew McLean (AUS)**	
11.15 – 11.30	Is there a need for improving the understanding of horse behavior? (safety)	P Hendrickson (Denmark)
11.30 – 11.45	Road safety: is there a relationship between 'near misses' & the use of rider & horse reflective/fluorescent equipment	R Scofield, H Savin, H Randle (UK)
11.45 – 12.00	Creating & validating a survey to assess sportsmanship in horse show	K Waite, C Heleski, M Ewing

	participants	(US)
12.00 – 12.15	Show horse welfare: the viewpoint of judges, stewards & show managers	M Voigt, A Borron, C Croney, K Hiney, K Waite, C Brady (US)
12.15 – 1.15	**Lunch and "Show & Tell" Presentation**	
	Session Chair – Natalie Waran (UK)	
1.15 - 2.00	**Research on the human/horse/saddle interface**	H Clayton (US)
2.00 – 2.15	Development of a new method for objective measurements of learning through negative reinforcement	L Ahrendt (Denmark)
2.15 – 2.30	A method of measuring bit-induced pain and distress in the ridden horse	R Cook (US)
2.30 – 2.45	Facial expressions of pain in horses undergoing routine castration	M Minero, E Dalla Costa, D Lebelt, D Stucke, E Canali, M Leach (Italy, Germany, UK)
2.45 – 3.00	Qualitative (perceived) versus quantitative (actual) assessment of rein tension: what lessons can be learnt?	H Randle, A Abbey, K Sears (UK)
3.00 – 3.45	**Afternoon Tea/Coffee Break & Posters (Poster Chair – Inga Wolframm (NL)** **ODD NUMBERED POSTER PRESENTERS TO BE BY POSTERS**	
	Session Chair – Sarah Ralston (US)	
3.45 –	Two methods of measuring in-vivo	O Doherty, V

4.00	pressures applied by a cavesson noseband	Casey, P McGreevy, R Conway, E O'Muiris, Y Xu (Ireland, Australia)
4.00 – 4.15	The effect of different head-neck positions on the EMG-activity of the m. splenius, m. trapezius and m. brachiocepahlicus	K Kienapfel, H Preuschoft, A Wulf (Germany)
4.15 – 4.30	Impact of head-neck positions on the expressive behavior of dressage horses	Y Link, K Kienapfel (Germany)
4.30 – 4.45	Applications & use of smart textiles & technology in equine science	J Ternstrom, L Hawson, E Gunnarsson, T Engvall, M Karisteen, M Sundin, L Berlin, A McLean, P McGreevy (Sweden, Australia)
4.45 – 5.05	Invited Practitioner Talk – Common sense methods of enhancing race horse welfare	Janet DelCastillo – author of Backyard Racehorse (US)
6.00 - 10.00	**Conference Dinner at Fair Hill Training Center, Guest speakers – Alex Brown (author of Greatness and Goodness: Barbaro and his legacy) and Tim Woolley (race trainer at Fair Hill), Networking**	

Friday 19 July 2013 – Scientific Conference Day 2		
8.30 – 9.00	**Introduction to Day 2 & Housekeeping**	C Heleski, C Wickens, H Randle
	Session Chair – Michela Minero (IT)	
9.00– 9.45	**What about the other 23 hrs of the day?**	J Ladewig (Denmark)
9.45 – 10.00	Revolutionary equine group housing system with automatic roughage feeding system moving in between a group: the effect of increasing from 3 to 6 feeding runs	M VanDierendonck, T Vogel-vanVreeswijk (Belgium, Netherlands)
10.00 – 10.15	Do horses benefit from provision of shade in hot, sunny weather, and do they prefer it?	K Holcomb, C Tucker, C Stull (US)
10.15 – 10.30	Effect of T-Touch on behavior of saddle horses	B Padalino, M Siniscalchi, R Lusito, A Quaranta (Italy)
10.30 – 11.15	**Morning tea & Posters (Poster Chair – Inga Wolframm (NL)** **EVEN NUMBERED POSTER PRESENTERS TO BE BY POSTERS**	
	Session Chair – Orla Doherty (IRE)	
11.15 – 11.30	Novelty seeking & startle response in adult domesticated horses	J Berger, A Brubaker, N Willits, R Coss (US)

11.30 – 11.45	Novelty seeking & object play behavior in adult domestic horses	A Brubaker, J Berger, N Willits, R Coss (US)
11.45 – 12.00	The use of temperament tests for the evaluation of police horses	M Pierard, G Verbeke, R Geers (Belgium)
12.00– 1.15	**Lunch and "Show & Tell" Presentation**	
	Session Chair – Hayley Randle (UK)	
1.15 - 2.00	**Arousal, attachment and affective state**	P McGreevy & A McLean (Australia)
2.00 – 2.15	Who's in a better mood? Comparison of behavioral indicators in horses trained with negative or positive reinforcement	A Zollinger, S Briefer, E Briefer, Y Gindrat-von Allmen, C Wyss, I Bachmann (Switzerland)
2.15 – 2.30	Assessment of horse optimism following negative or positive reinforcement	S Briefer, E Briefer, A Zollinger, Y Gindrat-von Allmen, C Wyss, I Bachmann (Switzerland)
2.30 – 2.45	The force of whip impacts delivered by jockeys using forehand & backhand strikes	P McGreevy, L Hawson, A McLean (Australia)
2.45 – 3.00	Evaluation of whip use & prevalence in elite and non-elite show jumpers	C Watkins, D Murphy (UK)

2.45 – 3.45	**Afternoon Tea & Posters (Poster Chair – Inga Wolframm (NL)** **ODD NUMBERED POSTER PRESENTERS TO BE BY POSTERS**	
	Session Chair – **Amy McLean (US)**	
3.45 – 4.00	A comparison of negative and positive reinforcement in naïve horses	C Bierke, R Meinen, E Wilkens, M Leponiemi, K Hiney (US)
4.00 – 4.15	Exploring clicker training: a method of positive reinforcement to improve the welfare of horse training	O Turner (UK)
4.15 – 4.30	Does the human voice have a calming effect on horses?	K Merkies, H MacGregor, M Ouimette, E Bogart, K Miraglia (Canada, France)
4.30 – 4.45	Does groundwork according to learning theory affect unwanted behavior of riding school horses during regular lessons?	M Pierard, M Vincke (Belgium)
4.45 – 5.00	Closing of the scientific portion of the conference	C Heleski & C Wickens; members of ISES Presidential Council
5.00 – 6.45	**ISES AGM**	

Saturday 20 July 2013 – Practical Day PLEASE BE ALERT FOR ANNOUNCEMENTS AS SOME TIMES MAY CHANGE SLIGHTLY		
OPTION 1 – at end of day, buses will return to hotel		
8.15	BUSES LEAVE HOTEL	
9.00 – 11.30	'Is it Physical, Psychological or Both'	Prof Sue McDonnell at the New Bolton Center
11.30 – 12.30	**Lunch**	
12.30 – 2.15	Application of learning theory for behavior modification (e.g. needle shyness & clipper aversion); bridleless jumping	Angelo Telatin & students
2.15 – 4.00	Semi-feral pony herd & making of equid ethogram	Prof Sue McDonnell

Saturday 20 July 2013 – Practical Day PLEASE BE ALERT FOR ANNOUNCEMENTS AS SOME TIMES MAY CHANGE SLIGHTLY		
OPTION 2 – at end of day, buses will return to hotel		
8.15	BUSES LEAVE HOTEL	
9.00 – 11.00	Hassler Dressage at Riveredge	http://hasslerdressage.com/hasslerdressage/
12.00 – 1.00	**Lunch at Delaware Park**	
1.00 – 4.00	Delaware Park	http://www.delawarepark.com/racing.php Thoroughbred flat racing

POSTERS – EVEN NUMBERED – CORRESPONDING TO ABSTRACT NUMBERS
#36 The path to success: career development in equestrian coaching – I Wolframm, S de Bruijn, J Barron, A Hoogenboom (Netherlands, UK)
#38 Equine extracurricular activities affect student success in a university horse program – L Hubbs, R Hoffman, W Gill (US)
#40 Impact of a new equine behaviour and welfare course on student views of important equine welfare issues – J Weir, C Wickens (US)
#42 The relationship between whip use and final race position – K Grills, H Randle (UK)
#44 A preliminary study on the effect of whip use on high and low speed index racing Quarter Horses – K Merkies, N Durand, K Joyce, C Zegers (Canada)
#46 Upper body lateral deviation of horse riders, with unilateral leg movement, seated on a gym ball – G Tabor, H Randle (UK)
#48 An update on the Equitarian initiative – do working equids fit within the scope of equitation science? – C Heleski, A McLean (US)
#50 Healing the troubled horse: a phenomenological study of horsemanship – D Hawkyard (UK)

#52 Effect of blankets on heat dissipation after exercise in unclipped & clipped riding horses – E Hartmann, K Dahlborn (Sweden)
#54 Valuing Thoroughbreds in the Australian recreational riding horse market – P McGreevy, C Oddie, L Hawson, A McLean (Australia)
#56 Validation of a simple method to quantify equine thoracolumbar posture – G Tabor, H Randle(UK)
POSTERS – ODD NUMBERED – CORRESPONDING TO ABSTRACT NUMBERS
#35 Coach feedback type in relation to rider perception and effects on overall performance – G Kennerley (UK)
#37 Talking horses at the grass roots: writing for horse people about equine science – A Henderson (Canada)
#39 A fly on the wall: an ethnographic view of animal care & use – K Bump (US)
#41 Effect of leg preference & track direction on racehorse performance – K Grills, H Randle (UK)
#43 Ear direction is related to jumping success – K Merkies, T Reid, S Seewald (Canada)
#45 Perfect passage – K Merkies, J Sheiner, M Tiidus (Canada)
#47 The effect of human body posture on horse behaviour – K Merkies, H MacGregor, M Ouimette, E Bogart, K Miraglia (Canada, France)

#49 Clever Hans one century late. Does a horse perceive human subtle cues? A pilot study – P Baragli, A Lanata, V Vitale, A Greco, C Sighieri, E Palagi (Italy, Spain)
#51 The effect of feeding management on crib-biting frequency and duration – L Nicholls (UK)
#53 Observation on the hematology of Standardbred horses in training & racing in Italy – B Padalino, G Rubino, R Lacinio, F Petazzi (Italy)
#55 Is horse head position used as an indicator of training in advertisements? K Hutchings, H Randle (UK)

Biographies of Plenary Speakers and Practical Day Presenters

Hilary Clayton

Dr. Hilary M. Clayton (BVMS, PhD, Dipl. ACVSMR, MRCVS) is an honorary fellow of the International Society of Equitation Science. She has performed extensive research on the biomechanics of equine locomotion, conditioning programs for equine athletes and the effects of tack and equipment on the horse and rider. Her findings have been published in over 200 peer-reviewed manuscripts and seven books. She is President of the American College of Veterinary Sports Medicine and Rehabilitation and has been a member of the USEF Dressage Committee since 2009. Dr. Clayton has been inducted into the Saskatchewan Sports Hall of Fame, the International Equine Veterinarians Hall of Fame, and the Midwest Dressage Association Hall of Fame. Her recreational interests revolve around training and competing in equestrian sports; she currently specializes in training dressage horses through the Grand Prix level.

Paul McGreevy

Paul McGreevy is Professor of Animal Behaviour and Animal Welfare Science at the University of Sydney's Faculty of Veterinary Science. Paul spent five years in mixed practice before taking a PhD in horse behaviour at the University of Bristol. He is recognized a specialist in veterinary behavioral medicine by the Royal College of Veterinary Scientists and is a co-founder and former president of the international Society for Equitation Science. His most significant research discoveries lie in the fields of normal and abnormal behavior, training and welfare in domestic animals, especially dogs and horses. The results of Paul's research findings have been published in 6 books (including *Carrots and Sticks, Equine Behaviour – a guide for veterinarians and equine scientists* and *Equitation Science*), 30 book chapters and over 140 peer-reviewed journal articles. His contribution to the field of animal welfare has been acknowledged with several Australian and international awards.

Andrew McLean

Dr. Andrew McLean is the Honorary President of ISES and brings together a rare combination of academic and equestrian achievement. In the early 1990's Andrew determined to explore the science of horse training. He found that very little had been scientifically identified or explained, leading to his PhD on the topic. A prolific author of books and journal papers on the science and ethics of horse training, Andrew has won Australia's most prestigious science award, the Eureka Prize for Science along with Professor Paul McGreevy and Dr. Bidda Jones. In Equestrian Sport, he has represented Australia in Eventing, was short listed for the Australian team for the WEG in Stockholm in 1990, has ridden to Grand Prix in show-jumping and trained to Grand Prix in dressage. He developed and manages the Australian Equine Behaviour Centre, the internationally recognized horse training and behavior modification centre in Australia. Andrew is also well known for his acclaimed systematic approach to elephant training in Nepal and India where his work is endorsed, continued and supported at government level.

Jan Ladewig

Jan has a degree in veterinary medicine from the Royal Veterinary University in Copenhagen, Denmark, and a PhD degree in Animal Behavior from University of California, Davis, USA. He worked as a research associate in Germany, conducting research on behavioural and physiological reactions to stress in cattle, pigs and horses, as well as measurement of motivation in pigs by operant conditioning procedures. Jan has been an active rider since childhood. He is particularly interested in the scientific background of training horses, as it relates to riding safety and horse welfare.

Hayley Randle

Dr. Hayley Randle is the Junior Vice-President of ISES. She holds a BSc (Hons) in Biology and Psychology and has a PhD in Animal Science. She runs BSc and Masters Equitation Science programs at the Equitation Science Academy at Duchy College in the UK, alongside coordinating the Higher Education provision at the college working with Plymouth University. She has been involved in large mammal behavioral research for the past 19 years. Her research interests focus on animal (in particular equine) behavior, training and individual differences. Hayley has successfully competed in Endurance but is now mainly enjoying any spare time with her horse, her dogs, and her family.

Natalie Waran

Natalie gained her BSc (Hons) in Zoology from Glasgow and a PhD in Applied animal welfare from Cambridge University Veterinary School, after which she joined Edinburgh University to develop new Master's programs in applied animal behaviour and animal welfare, and Equine Science. She moved to NZ in 2004 to become Professor of Animal welfare and head of the Department of Natural Science at Unitec in Auckland. She returned to the UK in 2011, and is now the Jeanne Marchig Professor of Animal Welfare at Edinburgh University where she is the Director of the JM International Centre for Animal Welfare Education based at the Royal (Dick) School for Veterinary Studies. Natalie has published widely, including editing a book on the Welfare of Horses. Her research interests in equine behavior and welfare include pain assessment, transport, development of feeding devices and individual variation, and developing methods for assessing positive emotions in horses. Natalie is one of the founders of Equitation Science and a former senior vice president of the ISES. Currently she is a Trustee for the Brooke Animal Hospital. She was chair of the local organizing committee for ISES UK 2012, and can appreciate just how much work has gone into organizing the US conference this year!

Sue McDonnell

Dr. Sue McDonnell holds BS and MS degrees in human and animal psychology, a PhD in reproductive physiology and behavior from the University of Delaware, and is board certified as an Applied Animal Behaviorist by the Animal Behavior Society. Her career has been based at the University of Pennsylvania School of Veterinary Medicine's New Bolton Center, where she is currently an Adjunct Professor and Clinical Associate of their Widener Hospital, and Founding Head of the Havemeyer Equine Behavior Program. Her work at Penn Vet includes clinical, research, and teaching activities in reproduction and behavior, with particular expertise in stallion reproductive physiology and behavior. Dr. McDonnell consults with veterinarians and farm managers internationally on stallion breeding behavior and management. In addition to scientific research publications, clinical case reports and review chapters, Dr. McDonnell has authored two introductory level books on horse behavior, as well as a book and DVD entitled *The Equid Ethogram: A practical field guide to horse behavior,* cataloging behavior of horses under both domestic and natural conditions. She writes a monthly column for *The Horse* magazine, and contributes regularly to other equine industry magazines in North America and Europe.

Angelo Telatin

Angelo Telatin is the Director of the Equine Studies Program at Delaware Valley College and one of only 64 British Horse Society Fellows in the world. He obtained a master's degree "Laurea" from the University of Padua, one of the most prestigious universities in Europe. For his final thesis in Equine Behavior he explored "The Comparison between Equine Training Techniques and the Psychology of Learning." This unique life experience allowed him to fuse the academic discoveries in animal communication with horse training techniques into a new and powerful training tool: Conscious Horsemanship. Telatin has personally won and coached many students to win numerous championships in show jumping. He is the head coach for the Delaware Valley College Intercollegiate Dressage Team (IDA) and he prepares riders for regional and national competitions where they have won many individual and team medals. His most recent accomplishments include coaching the 2011 IDA Reserve National Championship Team and Individual Champion.

1. Advancing evidence based practice and learning in equitation

Natalie Waran*[1] and Hayley Randle[2], [1]*University of Edinburgh*, *Edinburgh, UK*, [2]*Duchy College*, *UK*.

Evidence-Based Practice and Evidence-Based Learning are the cornerstones of an approach that encourages professionals to use the best evidence possible when making decisions about the methods/treatments/actions employed to achieve their goals. Evidence-Based Learning promotes the use of key elements to guide the understanding and practice of any professional including the development of questions using research-based evidence, the level and types of evidence to be used, and the assessment of effectiveness after completing the task or effort. The goal is to eliminate unsound or excessively risky practices in favor of those that have better outcomes. This approach to practice, contrasts with that frequently observed in the horse industry, where actions are often based on traditional methods, opinion and fashion. Examples of a reliance on dogma, or "the way it was always done" can be found in almost every profession, even when those practices are contradicted by new and improved information, and even where there are obvious risks to the health and welfare of those involved. Equitation science is a relatively new area of scientific inquiry – bringing together a range of disciplines with the aim of improving the welfare of the working horse in their interactions with humans. The aim of equitation science is to embed a new tradition of equine management, training and performance based upon evidence gained through rigorous use of the scientific method (whether quantitative or qualitative), understanding of the application of learning theory and a recognition of the importance of an ethical sustainable approach to the use of the horse. This paper will explore the ways in which new educational initiatives such as postgraduate level professional development courses can help to achieve this aim.

Keywords: Equitation, science, education, evidence, practice, learning

2. Using models of legitimacy to build messages about Equitation Science.

Karin Bump*, *Cazenovia College*, *New York, USA.*

In considering ways to get the message out about Equitation Science and Learning Theory, it is useful to examine the way the message is framed. Using models of legitimacy, messaging can be created in such a way to not only draw in participants, but also identify Equitation Science (ES) as operating in mutually beneficial ways to horse and rider. It can also be a mechanism to showcase ES as operating in ways that are right and appropriate in terms of animal care and use. This type of messaging is particularly important given a combination of shifting societal norms about animals along with lack of general familiarity and understanding of horses and other forms of livestock. Literature in the Social Sciences including empirical research in Legitimacy (Bump, 2009) can be used to suggest approaches to building legitimacy in messaging. A three component framework of legitimacy is offered with Pragmatic, Moral, and Cognitive forms (Boulding,1974; Bump, 2009). Pragmatic legitimacy is considered within views of how ES fits needs for human and horse and offers mutual beneficial outcomes to each. Moral legitimacy is considered by the extent to which activities involved with ES are viewed as 'right and appropriate' within socially constructed norms in the environment the ES activity exists. Cognitive legitimacy occurs when ES is framed in such a way that an audience is unable to imagine the environment without access to ES. Historically, living and working with horses was undeniably legitimate. Horses met essential societal needs (Pragmatic Legitimacy) and few questions were raised about whether working and living with horses was appropriate (Moral Legitimacy). It was beyond comprehension to consider a life without horses (Cognitive Legitimacy). However, today's world is much different and those involved with Equitation Science can benefit from utilizing a framework of Pragmatic, Moral and Cognitive legitimacy in outreach and education messaging.

Keywords: Equitation science, legitimacy, outreach

3. Sport psychological skills in jumping riders

Inga Wolframm* and Elin Ottersky, *University of Applied Sciences Van Hall Larenstein*, *Wageningen, The Netherlands*.

Empirical evidence suggests that there are a number of psychological skills that distinguish more elite from less successful, non-elite athletes. Few research efforts have focused on equestrian showjumping. Therefore, the aim of the study was to investigate sport psychological skills in jumping riders at different levels. American jumping riders (N=73; 16 male, 57 female; international: N=15, national: N=51, regional: N=7; showjumping: N=67, hunter: N=6) were recruited at two national shows to complete the Test of Performance Strategies (TOPS), an inventory designed to test sport psychological skill use during training and competition. The TOPS was adapted to equestrian sports and for use in competition only. The "TOPS-E", composed of nine sport psychological factors, with 4 items per factor, was tested for internal reliability using Cronbach's alpha. The factors of self-talk, emotional control, automaticity, goal-setting, imagery, relaxation, negative thinking; attentional control showed good reliability (α=.71; .91; .74; .79; .68; .86; .84; .78). Activation had poor reliability (α=.36) and was removed from further analysis. The effect of gender, level and discipline on sport psychological skills was explored using multivariate analysis of variance. No violations of homogeneity and equality of variance were noted. Most important results showed a significant effect of competitive level on automaticity ($F(2,67)=5.06$; $p=0.01$). Post-hoc tests revealed significantly higher levels of automaticity for international compared to regional riders (16.4±3.36 vs. 11.71±2.49; $p<0.01$) and national and regional riders (15.43±2.68 vs. 11.71±2.49; $p=0.01$). Pearson's correlations revealed significant correlations between years of participation and emotional control ($r=.27$; $p<0.05$), automaticity ($r=.34$; $p<0.005$), attentional control ($r=.28$; $p<0.05$) and negative thinking ($r=-.31$; $p<0.01$). Results indicate that more competent riders use automated sets of skills. Furthermore, attentional, emotional and thought control is likely to develop with experience.

Layperson's paragraph: Results indicate that the ability to use riding skills (aids) without consciously thinking about them when performing in the ring is an important element of jumping rider expertise. As with the ability to hold one's focus, keep emotions and negative thoughts under control, automaticity seems to develop with years of practice.

Keywords: Sport psychology, showjumping

4. Horses as self-objects: female riders, relationship styles and how they perceive their horses

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The psycho-analytical concept of self-psychology assists therapists in determining patients' intrinsic needs and resulting relationships by identifying relevant "self-objects". People, objects and experiences may all be considered self-objects and provide feedback that either fuels or undermines a person's self. "Mirroring self-objects (MS)" confirm the self in its entirety; while "Idealizing self-objects (IS)" sustain the self by becoming part of an admired self-object and "Twinship self-objects (TS)" enable a person to find likeness in and "oneness with" another. Preliminary research argues that animals provide varying degrees of self-object feedback as their owners may form lasting relationships with them. The aim of this study was to investigate whether relationship status impacts on women's perceptions of their horses as self-objects. German female riders (N=296) were recruited via social media, completed the Companion Animal Self-object Questionnaire (CAS-Q), and indicated whether they had a relationship, lived with their partner or had children. Eleven percent was younger than 20 years, 68.9% was between 20-40 years, and 19.9% was older than 40 years. Reliability analysis of the CAS-Q showed good internal consistency of the MS, IS and TS scale (Cronbach's alpha: α=0.85, 0.72 and 0.87 respectively). Results of Mann-Whitney U tests indicate that female riders in a relationship scored significantly lower on MS ($U=10.96$; $p<0.05$; 15.93vs.16.75) and TS ($U=11.24$; $p<0.05$; 13.79vs.15.05) than riders without a partner. No significant differences for women's self-object perceptions were found between living arrangements or whether they had children. Findings indicate that women without partner confirm their identities more positively through their horses (MS) and experience greater levels of "oneness" (TS) with them, perhaps because they see relationships with their horses as substitutes for other relationships. Future research should investigate whether differences in self-object perceptions also affects women's behavior towards their horses.

Layperson's paragraph: Female riders without a partner have been found to consider their horses as a mirror of themselves and are more inclined to view themselves and their horses as "one". Differences in perception might also result in women behaving differently towards their horses.

Keywords: Relationship, self-object, horse-rider

Older, wiser and less likely to worship their horse: the value of self-objects in horse-human relationships

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The psycho-analytical construct of self-psychology determines how individuals define themselves and their relationships with others based on elements that surround them. People, objects or experiences may all be considered self-objects and provide feedback that can provide cohesion to a person's self. "Mirroring self-objects (MS)" confirm the self in its entirety; while "Idealizing self-objects (IS)" sustain the self by becoming part of an admired self-object and "Twinship self-objects (TS)" enable a person to find likeness in another. Self-psychology has been used previously to examine people's motives for owning animals and the human-animal bond. The aim of this study was to investigate whether age and level of experience might impact on riders' perception of their horses as self-objects. Dutch female riders (N=451) were recruited via social media and completed the Companion Animal Selfobject Questionnaire (CAS-Q), indicating their age, riding experience, and length of horse ownership. Reliability analysis of the CAS-Q showed good internal consistency of the MS, IS and TS scale (Cronbach alpha coefficients of α=0.76, 0.72, and 0.86 respectively). Relationships between variables were investigated using Spearman's Rho correlations. Weak but significant negative correlations were found between age and MS (r_s=-.17; p<0.001), age and IS (r_s=-.26; p<0.001); riding experience and MS (r_s=-.15; p<0.005), riding experience and IS (r_s=-.24; p<0.001). A significant positive correlation was found for length of ownership and TS (r_s=.11; p<0.05). Findings seem to indicate that with increasing age and increasing riding experience female riders tend to rely less on their horses to confirm their own identity via MS or IS. Findings also indicate however that the longer riders have owned their horses, the more they tend to experience them as TS. This may be indicative of a theme common to equestrian sports: that of "oneness" between horse and rider.

Layperson's paragraph: People are thought to identify themselves and their relationships through different objects, including horses. The longer riders own their horses, the more they are likely to consider themselves and their horses as "one". At the same time, older, more experienced riders are less likely to define their own identity through their horses.

Keywords: Self-objects, horse-rider bond

5. Is there a need for improving the understanding of horse behavior?

Payana Hendriksen*, *Danish Animal Welfare Society*, *Frederiksberg, Denmark*.

Every year 5.8 % (7,000) Danish riders enter the emergency room due to their hobby with horses. Half of the accidents happen while the rider is standing next to the horse, presumably as a result of the rider misinterpreting the behavior of the horse. There is limited education in horse behavior in Danish riding schools. Hence the Danish Animal Welfare Society created a web site where riders could gain knowledge and test their understanding by watching film clips illustrating different horse behavior. The aim of the study was to achieve an overview of the knowledge of Danish riders across geographical regions, age groups and experience levels concerning equine behavior. This was gained by analyzing 4,539 test results from the website. On average riders scored 72.5 % correct. No difference was found across regions (ANOVA, $F=1.289$, $P=0.244$). Individual age groups differed in test score (ANOVA, $F=30.563$, $P<0.001$), the youngest (5-14 years old) and oldest (60-90 years old) riders achieving the lowest score. Riders rated their own experience level concerning horse behavior, these levels differed in test score (ANOVA, $F=77.289$, $P<0.001$). The higher the riders considered their own experience level the better the test result. Riders who considered themselves experts in horse behavior scored an average of 76.2 %, which did not differ much from riders considering themselves as having a high (75.0 %) or average (72.4 %) level of experience. When asked if a horse was showing signs of conflict, the participants scored an average of 73.0 %. But when asked to specify how a horse would indicate conflict or naming subtle conflict behavior types, the score would drop to 54.5 %.
This study indicates that riders have a good overall understanding of horse behavior, but deficiencies were found when riders should elaborate on their understanding of horse behavior types. This finding and the difference in understanding among both age groups and experience levels can be used when planning target groups and topics of future campaigning and educations programs in horse behavior.

Layperson's paragraph: Many accidents in the horse sector presumably happen due to a misinterpretation of the horse. This study found that especially the younger and the older riders have deficiencies in their knowledge of horse behavior and many riders have an incorrect idea of their own level of experience.

Keywords: Accidents, education, horse behavior

6. Road safety: is there a relationship between 'near misses' and the use of rider and horse reflective/fluorescent equipment

Rose M. Scofield*, Hannah Savin, and Hayley Randle, *Duchy College*, *Callington, Cornwall, UK*.

Anecdotal evidence suggests that horse riders frequently encounter dangerous incidences with traffic (known as 'near misses') on the United Kingdom (UK) road system. Previous research has stated that drivers exhibit different hazard perception and reaction than horse riders. Additionally younger drivers reported feelings of frustration when encountering a slow moving horse and rider combination. The aim of this study was to investigate the relationship between the occurrences of near misses (NM) and the use of fluorescent/reflective (FR) equipment on riders and horses. A questionnaire distributed via equine websites and forums was completed by 426 riders using the UK road system. Participants answered questions regarding the FR equipment they and their horses were wearing in NM incidents, and those not reporting NM were also asked to state what FR they and their horse wore while riding. A higher number of riders reported experiencing NM with traffic in the last year (60.3%). There was no significant relationship between riders wearing FR tabards or not and incidence of NM ($Chi^2$1.02, d.f. =1,P>0.05), or between horses wearing FR or not and incidence of NM (Chi^2 0.23, d.f.=1, P>0.05). However there was a significant relationship between riders wearing lights or not and incidence of NM (Chi^2=4.22, d.f.=1, P<0.05). Inspection of standardized residuals indicates that there are significantly less incidences of NM when riders were wearing lights. This suggests that wearing lights should possibly be recommended when riding on the roads to enhance the safety of both rider and horse and contribute to the welfare of the leisure horse in particular.

Layperson's paragraph: Results of questionnaire based study in the UK indicate that either the horse or the rider wearing reflective/fluorescent clothing is not related to the occurrences or absences of near misses. However significantly less near misses occur when the rider is wearing lights. The use of lights by a rider and horse combination may prove a sound contribution to the welfare of the leisure horse in avoiding possible road accidents.

Keywords: Horse, rider, road safety, accident, fluorescent/reflective

7. Creating and validating a survey to assess sportsmanship in horse show participants

Karen Waite*, Camie Heleski, and Martha Ewing, *Michigan State University*, *East Lansing, MI, USA*.

There is no comprehensive psychometric tool to measure sportsmanship specifically in equestrian sport. Hence, the aim of this study was to develop a preliminary scale for measuring prosocial and behavior at horse shows. With such a tool, a clearer picture and understanding of the behavior of the competitive equestrian will emerge, and it will be possible to develop and test interventions for improving sportsmanship behaviors at competitive equine events. Participants consisted of 10 youth horse show exhibitors, aged 13-19 years, 10 parents of youth horse show exhibitors, 10 4-H Horse and Pony Project adult leaders, and 10 4-H horse judges. Participants were asked to identify pro and antisocial behaviors that they had observed in equestrian competitors toward fellow competitors, show management, coaches, trainers or parents, and their equine partners. Investigators compiled the resulting list of behaviors and those appearing twice or more were shared with five collegiate equestrian team members to narrow the list of items. The resulting list of 56 items was then pilot tested with 26 youth equestrian competitors aged 13-19 (M=16.24) utilizing a Likert scale to determine how frequently they had engaged in each behavior in the past two years of horse showing activity. Eight-nine percent of those responding were female, and had a mean of 9.3 years of horse showing experience. In the past two years, 42.3 % participated primarily in 4-H level activities, while 46 % participated in breed association sponsored events. Pilot test survey data were used to determine those behaviors that occurred somewhat frequently by selecting those with mean Likert scores between 1.6 and 4.5. As a result, 26 items were retained for the equine sportsmanship survey tool, which are being tested during the 2013 horse show season. Eight hundred fifty nine individuals have responded to the survey, with 96.3% respondents female. Survey validity data will be presented at the conference.

Layperson's paragraph: The purpose of this study was to develop a scale for measuring sportsmanship behavior at horse shows. With such a tool, a clearer understanding of the behavior of the competitive equestrian will emerge, and it will then be possible to develop and test interventions for improving sportsmanship attitudes and behaviors at competitive equine events.

Keywords: Sportsmanship, psychometric, tool, human behavior

8. Show horse welfare: the viewpoint of judges, stewards and show managers

Melissa Voigt*[1], Abigail Borron[1], Candice Croney[1], Kristina Hiney[2], Karen Waite[3], and Colleen Brady[1], [1]*Purdue University*, *West Lafayette, Indiana, USA*, [2]*University of Wisconsin - River Falls*, *River Falls, Wisconsin, USA*, [3]*Michigan State University*, *East Lansing, Michigan, USA*.

Animal welfare has become a growing concern among US citizens which has placed increasing pressure on the horse industry to address issues concerning show horses. Many organizations have convened committees to review, address and reduce the occurrence of compromises to horse welfare. The current study was developed with the intent of gaining understanding of how show horses are treated through the viewpoint of horse show professionals and to advocate for a better means of improving show horse treatment and care. Utilization of Feminist Animal Care Theory (FACT) creates a position of advocating for welfare concerns of show horses focusing on the control driven relationship between humans and horses. FACT promotes changes in policies and practices that can address current structures of objectification and domination, and thereby improve conditions to which some show horses are currently subjected. This study included 13 horse show professionals involved in stock type horse shows: judges, stewards, and show managers. Open-ended phone interviews were conducted to collect data pertaining to the professionals' observations, perceptions and understanding of compromises to horse welfare. Using qualitative analysis procedures, prominent themes emerged from the interviews: 1) an inability to clearly communicate a comprehensive understanding of equine welfare; 2) identification of novice trainers, uneducated owners and novice riders as most frequently being observed compromising show horse welfare (SHW), although not always being intentional; 3) a belief that mentoring relationships, peer intervention and educational media/clinics were the best approaches to decrease the frequency of compromises to SHW. The American Quarter Horse Association (AQHA) was identified as the lead organization taking a proactive approach to decrease the frequency of compromises to SHW. Future studies should: 1) examine AQHA's policies and procedures regarding show horse welfare; and 2) identify horse show participants' knowledge and understanding of compromises to SHW. Educational tools aimed at novice trainers, uneducated owners and novice riders should be developed to create awareness and understanding of ways to reduce compromises to SHW.

Keywords: Welfare, show horse, judge, steward, manager

9. Research on the rider-saddle-horse Interface

Hilary M. Clayton*, *McPhail Center, Michigan State University, East Lansing, MI, USA.*

The complex interaction between the rider, saddle and horse is a relevant concern in relation to performance and welfare of ridden horses. The force and pressure applied to a horse's back can be measured using an electronic saddle pressure mat. This talk will provide information about selection and use of a pressure mat for evaluating saddle fit and rider technique, and evaluation of force and pressure data. Common mistakes in using the equipment and assessing the results will also be covered.

Total force and pressure distribution on the horse's back vary in a cyclic pattern that is characteristic of each gait. In walk total force has only a small range with a maximal total force that is approximately equal to rider weight. In trot and canter the bouncing motion of the horse projects the rider upwards in the suspension phases which unloads the horse's back. As the rider descends to the saddle in the stance phases, total force increases and reaches a maximum as the horse starts to ascend and the saddle pushes against the rider's seat to provide an upward thrust. Maximal total force is approximately twice the rider's weight in trot and three times the rider's weight in canter. Threshold values for pressures associated with the development of ischemic damage and saddle sores have been established and it is currently recommended that mean pressure should be less than 11 kPa and maximal pressure should be less than 30 kPa. This talk will also summarize the findings of research studies describing the effects on the horse's back of different types of saddles, saddle pads and riding styles.

This information is of value to equitation scientists because it has applications in improving the horse's comfort, understanding the effects of different types of tack and riding techniques, and reducing the risk of back injury in ridden horses.

Keywords: Equitation science, saddle pressure, back injury

10. Development of a new method for objective measurements of learning through negative reinforcement

Line Peerstrup Ahrendt* and Janne Winther Christensen, *Dept. of Animal Science, Aarhus University*, *Tjele, Denmark*.

Much training of horses relies on negative reinforcement where the human trainer applies increasing pressure somewhere on the horse's body and releases when the desired behavioral response is shown by the horse. An objective measure for this ability would be useful in the scientific environment as well as for horse training in practice. In this study, we investigated if an algometer (Prod, TopCat Metrology Ltd, UK) could be used for objectively measuring horses' ability to learn a task based on negative reinforcement. 24 Icelandic horses (3 years old mares and geldings) were tested on their ability to learn to yield from pressure applied on the upper thigh with the algometer (pressure surface: Ø16mm). The force was applied with an approx. rate of 4 N/s (as indicated on the algometer) until the horse moved at least one hind leg laterally away from the pressure. The horses were submitted to 10 trials of pressure on each side on the first test day, 7 trials pr. side on the second test day and 5 trials pr. side on the third day. Preliminary statistical analyses indicated that the average force necessary for moving the horse decreased over the 3 test days (random intercepts model, mean (N); Day 1=24.6, Day 2=19.2, Day 3=18.9, s.e.=2.0, $p<0.005$), showing that the horses learned to move for lighter pressure over the three days. The data also showed a positive correlation between the three test days (Spearman's rank correlation, $p<0.05$), i.e. horses responding to a low average force on test day 1 also responded to lower force on test days 2 and 3, indicating stability in the horses' performance and stability over time in the method of measuring the performance. Furthermore, a positive correlation existed between the left and right sides of the horses (Spearman's correlation, $p<0.01$), showing that horses responding to a light pressure on one side also responded to a light pressure on the other side. More statistical analyses are currently being conducted.

Layperson's paragraph: The results of this study indicate that horses can learn to respond to lighter pressure and that an algometer measuring the force of the applied pressure may be used for quantification of this learning.

Keywords: Negative reinforcement, learning ability, algometer

11. A method of measuring bit-induced pain and distress in the ridden horse

Robert Cook*, *Tufts University, Cummings School of Veterinary Medicine*.

Between 2002 and 2008, using a psychometric approach (as typified by IQ 'measurement'), 58 riders switched their horse from a bitted to a bitless bridle and documented before-and-after ridden behavior. The experiments tested the null hypothesis that behavior would not improve when the bitted bridle was replaced. Riders answered a questionnaire listing 86 behavioral signs of bit-induced pain and distress in 8 categories. The psychometric 'instrument' (i.e., the questionnaire) was designed after 3 years of feedback from those who had already completed the switch. For example, the affective category of fear included signs associated with the sub-sections of fright, flight, fight and freeze, such as spook, bolt, buck and baulk. In column one (bitted), riders checked the signs they had recognized since owning the horse (median 2 yrs, range 9 months – 21 yrs) when ridden in its usual bitted bridle. In column two (bitless), they checked the list again after similar work in a crossunder bitless bridle (median period 3 months, range 1 day - 2 yrs). Horse's ages ranged from ranged from 3.5 -24 yrs, with a median of 8.5 yrs. They were of diverse breeds and used for one or more disciplines, e.g., dressage, jumping, eventing, endurance, trail and pleasure. Every horse showed fewer signs of pain and distress when bitless. The summated numbers were 1643 bitted and 202 bitless, an average improvement of 88% (median 91%, range 25-100%). The number of signs exhibited by each of the horses when bitted ranged from 5 to 55 (median 24) and when bitless - zero to 17 (median 1). The difference was highly significant (Wilcoxon W = 1770, estimated median difference = 22, $p<0.001$). The null hypothesis was refuted.

Layperson's paragraph: By replacing a bitted bridle with a crossunder bitless bridle, the number of signs of pain and distress exhibited by 58 horses was significantly reduced. By removing the bit, all riders discovered that their horses showed far more of these signs than they had ever supposed likely before the switch. Many of the signs eliminated included ones frequently associated with accidents. The results indicate that the welfare and safety of these horses and riders were significantly improved by replacing a bitted bridle with a crossunder bitless bridle.

Keywords: Horse, pain, bit, bitless, ethogram, psychometrics

12. Development of a facial expressions pain scale in horses undergoing routine castration

Michela Minero*[1], Emanuela Dalla Costa[1], Dirk Lebelt[2], Diana Stucke[2], Elisabetta Canali[1], and Matthew Leach[3], [1]*Università degli Studi di Milano*, *Milan, Italy*, [2]*Haveland Equine Hospital*, *Brielow, Germany*, [3]*Newcastle University*, *NewCastle, UK*.

The objective of this study was to develop and validate a standardized pain scale based on facial expressions of horses (*Horse Grimace Scale* HGS). Forty stallions of different breeds aged 1-5 years underwent routine surgical castration with closed technique under general anaesthesia. They were assigned to one of two treatment groups balanced for breed. A (n= 19) received one single injection of *Flunixin-Meglumine* immediately before anesthesia. B (n= 21) received *Flunixin-Meglumine* before anesthesia and six hours after the surgery. As a control group (C) horses (N=6) needing noninvasive indolent diagnostic procedures under general anesthesia were recruited. None of the subjects had pre-existing painful conditions. All horses were hospitalized in a clinic for 5 days in an observation box with two HD video-cameras positioned on the top opposite sides of the box. Thirty-minute videos were recorded on the day prior to surgery (baseline) and at 8 hours after anesthesia. From each video high quality images of the horses' head were extracted. These images were compared to identify changes in facial expressions (see Langford *et al*, 2010) by a treatment-blind observer experienced in assessing facial expressions in other species. Six facial action units were defined (stiffly backwards ears, orbital tightening, tension above the eye area, strained chewing muscles, mouth strained and pronounced chin, strained nostrils and flattening of the profile). 60 pre and 60 post treatment images (randomly selected) were then scored in a random sequence using the action units by five treatment-blind participants. The mean HGS was analyzed using a GLM for repeated measures with time (pre versus post treatment) as the within-subjects factor and treatment as the between subjects factor. 73,3% of images were correctly assessed as true post-surgery or true basal. Inter-class correlation coefficient among observers was 0.91 showing high inter-observer reliability. A significant effect of time, treatment and time*treatment were found ($P<0.001$). A and B significantly differed from C ($P<0.01$).

Layperson's paragraph: A new approach to assess pain based on a standardized scale of facial expressions has been developed. It has the advantages of being not time consuming, easily trainable and applicable.

Keywords: Horses, pain, facial expressions, castration

13. Qualitative (perceived) versus quantitative (actual) assessment of rein tension: what lessons can be learnt?

Hayley Randle*, Alison Abbey, and Kate Sears, *Duchy College*, *UK*.

Although Equitation Science studies have reported quantitative values for rein tension these have rarely been combined with qualitative assessment. This study aimed to examine both the quantitative and qualitative aspects of rein tension in order to identify potential difficulties during training. Voluntary participants at two UK national equine events stood on a 50cm high solid box positioned 1m from a life-sized artificial horse head mounted on a tripod fitted with a bridle (with cavesson noseband and single-jointed snaffle bit), soft rubber reins and a Centaur Rein Tension Gauge™, and were asked to pick up the reins. Participants rated their (perceived) rein tension (PRT) on a scale of 0 (none) to 8 (maximum) for their left and right hands, before applying their usual (actual) rein tension (ART) and the observer recorded the number of lights illuminated (0-8) for each hand, three times. The sample comprised 261 riders: 90% â™ □, 10% â™,; 30.6±16.3 years; 89% amateur, 11% professional, with 74% riding at least 3 times a week. The main disciplines engaged in were leisure riding (34.9%), show jumping (17.6%) and dressage (15.7%). All rein tension data were non parametric (AD tests $P<0.05$). PRT was significantly greater (median=4) than ART (median=1; $T=956809$; $P<0.001$). Both PRT and ART were greater for the right hand than the left hand ($T=5912.5$; $P<0.05$ and $T=19881$; $P<0.001$ respectively). Male riders had a more realistic idea of ART than females (male median=2 vs female median=3), as did professional riders (median difference=2 vs amateurs=3) and riders aged between 18-30 (median difference=2 vs 3 for all other age groups). It is important that both riders and trainers understand the difference between ART and PRT in order to safeguard the welfare of the horse during equitation.

Layperson's paragraph: There is a clear difference between what riders think they are doing and what they are actually doing. Fully understanding common equitation concepts such as rein tension is crucial to ethical progression in equitation and ensuring horse welfare.

Keywords: Rein tension, perception, quantitative, qualitative, training, welfare

14. Two methods of measuring in-vivo pressures applied by a cavesson noseband

Orla Doherty*[1], Vincent Casey[1], Paul McGreevy[2], Richard Conway[1], Eoin O' Muiris[1], and Yinle Xu[1], [1]*University of Limerick*, *Limerick, Ireland*, [2]*University of Sydney*, *Sydney, Australia*.

Pressures applied to horses via restrictive nosebands are of concern to equitation scientists. Two approaches were used to estimate *in vivo* noseband pressures applied to a horse's nose. A load-cell calibrated from 0 to 100 N was integrated into a cavesson noseband. Force values were recorded and, using Laplace's Law, were combined with anatomical curvature data to estimate the pressure acting on the underlying tissue along the internal surface of the noseband. Partial profiles of dorsal and ventral aspects of the horse's nose were fed into algorithms to transform the curvature into a corresponding sub-noseband pressure profile. Pressures were recorded while the horse chewed and when it was cued to step backwards. The calculated pressures ranged from 200-400 mmHg. In a follow-up study, carried out on the same horse, a biomedical interface pressure transducer (BIPT) was used to measure pressure at noseband-tissue interface sites while the noseband was tightened to two levels of tension (permitting two fingers, then one finger to be fitted beneath the noseband on the frontal plane). The BIPT, secured to the inner surface of the noseband, was connected to a wireless transmitter. Pressure data were recorded remotely and displayed in real time while the horse was ridden in a pattern on the flat and over a small jump. Synchronized video recordings allowed us to correlate events during data collection with observed pressure peaks. Peak pressures depended on noseband tightness and transducer location. In some instances, pressures in excess of the transducer saturation pressure (1400 mmHg, 186 kPa) occurred. Peak pressures occurred during head tossing, jumping efforts and mouth opening. The results of both studies indicate that sub-noseband pressures are of a magnitude that have been shown to induce tissue and nerve damage in humans. Further studies may identify whether similar damage is likely to be caused in horses.

Layperson's paragraph

Pressure applied by tight nosebands can restrict normal movements of the jaw such as chewing/yawning but the potential for damage to soft tissues, such as nerves, within the head is poorly understood. This research describes the development of two pressure detection systems that can be embedded into nosebands to measure conditions under the noseband itself.

Keywords: Noseband, interface-pressure, force, curvature, welfare, restricted movement

15. The effect of different head-neck-positions (HNPs) on the EMG- activity of the m. splenius, m. trapezius and m. brachiocephalicus

Kathrin Kienapfel*[1], Holger Preuschoft[1], and Arne Wulf[2], [1]*Ruhr-University Bochum*, *Bochum, NRW, Germany*, [2]*Wilhelms-University Münster*, *Münster, Germany*.

The aim of the present study was recording the surface EMG-activities of important muscles of the horse's neck in various HNPs. The electrical activities of the m. splenius, brachiocephalicus and trapezius were recorded on both sides. 5 horses, both with and without a rider, were examined in all three gaits on both hands in three different neck positions (a “free” position, a “gathered” (head higher, neck more flexed) position with the contour of the nose in front of the vertical , and a hyperflexed” position of the head with the mouth pointing towards the chest). The achieved HNP´s are significantly different ($p<0.05$) in the angle of the poll and the angle of the neck. Differences in the magnitude and timing of muscle activation between the neck positions, between left and right hand, with and without a rider, and left and right side of the body were evaluated and compared by standard statistical methods. No differences between ridden and unridden conditions could be observed. The m. brachiocephalicus is in the hyperflexed position in all gaits significantly ($p<0.01$) more active than in the gathered and free position, which are not significantly different. By contrast, the m. splenius is in the hyperflexed position in all three gaits less active than in the free position ($p<0.02$), in which it always shows the highest activity. In walking, the free and gathered positions deviate significantly. The m. trapezius is in the hyperflexed posture during walking significantly less active than in the free ($p<0.01$) and gathered ($p<0.01$) positions with the strongest activity in the free position. Again the free and gathered positions differ significantly ($p<0.01$). In trot the same pattern occurs, although the gathered and hyperflexed positions did not differ significantly. In the gallop, the activity of the m. trapezius shows no differences. Only the m. brachiocephalicus displays differences between both sides, the right m. brachiocephalicus being more active than the left ($p<0.05$). In HNPs with the noseline in front of the vertical the topline muscles of the neck (m. splenius, m. trapezius) are activated/trained. In contrast in the hyperflexed position a main muscle of the lower neck (m. brachiocephalicus) is activated/trained. These results should be considered by riders and judges as an undesired result of a HNP.

Keywords: EMG, HNP, muscle activity, hyperflexion, LDR, riding

16. Impact of Head-Neck-Positions on the expressive behavior of dressage horses.

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The “appropriate” Head-Neck-Position (HNP) in the dressage arena is fiercely debated. Previous studies already indicated that hyperflexion (rollkur or LDR) cause discomfort for the horses. The aim of the present study was to check the results of Kienapfel`s (2011) study concerning behavioral reactions of horses which indicate discomfort and further investigate the divergence of HNP and the resulting behavior between warming-up and competition. Of particular interest was the influence of HNP on the mark achieved in the competition. Therefore the behaviors of 180 horses were recorded for 3 minutes of active riding in the warming-up area and during the first 3 minutes of the competition. Both are compared to the achieved mark. Behaviors like tail-swishing, position of the ears, change in movement, different oral behaviors and head movements were observed. Furthermore, 105 scans were carried out at 3 events during 8 observation days every 15 minutes to determine the frequency of the scanned HNP in the warming-up area. Horses carrying their contour-line of forehead and nose “at/behind the vertical” and “behind the vertical.” exhibited significant more behaviors indicating discomfort (unpaired t-test, $p<0.05$) than horses with their nose held “in front of/at the vertical.”. The HNPs commonly were changed from warm up to competition: More horses were presented to the judges with the nose “in front of the vertical” or “at the vertical” than observed in the warming-up area ($p<0.05$). The HNPs had no directly visible effect ($p>0.05$) on the achieved mark in the competition, but a tendency was observed among riders in lower classes to get worse marks when they warmed-up with the head behind the vertical. In higher classes the tendency was reversed. In generally horses in higher classes showed more behaviors indicating discomfort than those in lower classes ($p=0.014$). Nearly 70% of the horses had to carry their nose behind the vertical in the warming-up area. Less than 12% were ridden “in front of/at the vertical”. These results seem to fall into the responsibility of the judges. Riding in a HNP with the nose-line behind the vertical is connected significantly more behavior indicating discomfort than in HNPs in front of the vertical. 70% of the horses in the warm-up area are ridden with their nose behind the vertical, which is in conflict with the FEI rules.

Keywords: Behavior, head-neck-position, rollkur, hyperflexion

17. Applications and use of smart textiles and technology in equine science

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In a unique collaboration between Chalmers University, Gothenburg University, The Swedish school of Textiles, The Australian Equine Behavior Centre and the University of Sydney we are applying Smart Textiles to important questions in Equitation Science. Smart textiles enable measurement of a vast array of different variables with minimal interference. A prototype textile ECG gauge has been produced. Very promising capitative measurements have been made on humans with these electrodes and similar textile electrodes have been incorporated into a tight sweater measuring ECG resistively. Some measurements on horses have been done, but further development of the fastening of the electrodes has to be done to get more reliable and stable results. It is considered possible to in a near future include these sensors in the horses' normal equipment, such as the girth or saddle coat. This suggests possible applications in exercise physiology, hospital and stud. At the time of writing, capitative measurements on humans with a Signal to Noise Ratio of 16 have been made. The researchers are keen to improve measurement of the interaction between horse and rider through incorporation of the measurement devices into pre- existing equipment. Textile sensors for measuring pressure are under development. In contrast with other research in the same field using spacer fabric, we use only a thin three layer textile. This is unique and enables very thin and flexible applications. At the time of writing these textile sensors can measure a pressure difference of 6 g per sensor. By bringing together different branches of the sciences from physics to physiological psychology these researchers intend to apply modern materials science solutions to age old equine welfare questions.

Layperson's paragraph: The research demonstrates the applications of Smart Textiles in equine science. This use of Smart Textiles enables measuring tools for example ECG and pressure incorporated into the horses' normal equipment.

Keywords: Technology, Smart Textiles, pressure, ECG, measurement

18. Practitioner talk - Common sense approaches to enhancing the welfare of race horses Janet Del Castillo, *Winter Haven, FL, USA, author of The Backyard Racehorse*

One of my primary goals is to encourage caring, competent Pleasure/Sport Horse participants to become part of the racing industry. Horse racing has been a dominant player in the equine world for many years. My personal experience into this world was by default when, after divorce, I was left with a small farm, race horses & no income. I found the race track intimidating & unwilling to share training techniques or advice. I decided to do what I could on my farm & see if the horses could become fit enough at home to race. The ensuing challenges made me knowledgeable about what newcomers need to know. I attended seminars & read everything I could find on training. When I saw how horses were treated at the track, stalled for 23 hrs/day & galloped 1-2 miles & then asked to race full speed so young, it didn't seem an ideal way to develop an athlete for a long career. Having to evolve a training program off track & breaking & galloping the horses myself, taught me to listen to the horse & learn about cause & effect. Keeping charts helped me see patterns emerge about how young horses respond to conditioning. I combined current literature about physiology, training modalities & medical applications with common sense. I learned about the dangers of short term fixes to long term problems. By applying common sense horsemanship to the racing industry I wrote BACKYARD RACE HORSE along with Lois Schwartz. My goal was/is to demystify the business of race horse training & to encourage more competent, caring, owner-trainers to become involved.

The general horse public may have a negative view of racing. When horsemen learn that they may train on the farm & control the health & welfare of their horse they are thrilled. I discuss studies about medications, suggest a training program that can be done in a variety of locations & teach how to transition the horse to the race track.

With coordination from the racing industry, The Jockey Club & the NTRA (National Thoroughbred Racing Association) we could revitalize the industry & change the perception of racing to the general public. I have been making an effort to speak to various organizations to see if we can bring more caring, competent horsemen into racing. We need owners who have responsibility & a genuine affection & respect for their horses. By educating owner-trainers we can start the process. It is only by making a united effort for common sense horsemanship & drastically reducing the use of medications in the industry that we can overcome the bad press & negative publicity that has been so detrimental to racing.

19. The other 23 hours of the day

Jan Ladewig*, *Copenhagen University*, *Denmark*.

Most horses are handled or ridden for only a few hours every day. The rest of the time they are by themselves. Obviously, if we expect our horses to perform optimally, whether during riding competitions, during leisure riding, or in other ways, and if we expect them to be safe to handle and to ride, we must consider the quality of these other 23 hours.

Horses have evolved to live in social groups on open plains watching for predators. A large part of the 24 h period they spend moving around slowly while they graze. Their anatomy, physiology, and their psychology are shaped to these conditions, and thousands of years of domestication have hardly changed these characteristics.

The conditions for many riding horses are very different from what horses evolved to live under. They are housed in individual confinement in closed buildings. They receive two to three meals a day and exercise for about one hour. Although more horses are let out on pasture nowadays, often they are kept alone on a flat, un-stimulating square with nothing to do.

For other social domestic animals such as pigs and cattle, individual confinement has to a large extent been replaced by loose housing. A similar change still awaits most horses. But many horse owners are afraid of keeping their horse together with other horses, because they fear that they will fight and injure each other. From observations on feral and wild horses we know that, although aggression naturally occurs, horses rarely hurt each other. One possible reason is that they are better socialized because they grow up together with conspecifics of both sexes and of many different ages.

If we want to improve the quality of the other 23 hours we need to mimic natural conditions as much as possible. To do so, we need more research on areas such as the socialization process of horses, how the optimal group composition should be, the effect of keeping horses in large groups, and how we best enrich the horse environment.

Layperson's paragraph: The more the environment of riding horses is shaped like natural conditions, the more harmonious they will be, and the better and safer a performance we can expect of them.

Keywords: Horse behavior, horse welfare, horse housing

20. Revolutionary equine group housing system with automatic roughage feeding system moving in between a group: the effect of increasing from 3 to 6 feeding runs

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Group housing sometimes has an increased risk of insufficient feeding and decreased resting time for lower ranked horses and a higher chance of interaction-induced injuries. This study aimed to assess the welfare effects of increasing roughage-feeding frequency (RFF) from 3 (3T) to 6 (6T) times per day on group-housed horses. In a revolutionary concept (FreeMovingEquineStable®) a large automatic feeding system moved in-between the horses and distributed roughage over large feeding troughs. Subjects were 47 riding school horses/ponies. According to a pre-planned balanced schedule, real time scoring by means of scan sampling and all occurrence sampling was performed: aggression frequency (AF); time budget (TB); spatial relationships (SR) and avoidance behavior for at least 8 days per trial. Body Condition Scores (BCS) were assessed before and after each trial. The AF was scored using video recordings before, during and after the feeding runs. Data were standardized; checked for normality (transformed when needed); the appropriate statistical tests were performed depending on the nature of the data.
Mean bite frequency and total aggression frequency before feeding decreased significantly in 6T compared with 3T (MWU: bite $p=0.003$; AF $p=0.03$). The AF during the day did not differ between trials (t-test: $t=-1.2$, $p=0.27$) and was relatively low and comparable with other studies. Horses spent more time resting (42 vs 22%; $t=-6.7$, $p<0.001$) and less time feeding (60 vs 39%; $t=5.7$, $p=0.001$) in 6T compared with 3T. Change in TB of low ranking horses was similar to that of middle and high-ranking horses (ANOVA: $p>0.05$). Average BCS did not differ between ranking groups and remained the same during both trials (t-test: $\alpha=0.008$: $t=20.3$, $p=0.03$). The SR and rank-order did not change. So despite the all horses spent less time eating, their BCS stayed the same; their resting time increased and the AT intensity and frequency decreased.

Layperson's paragraph: A new automatic feeding system made it possible to increase roughage frequency in group-housed horses from 3 to 6 times per day. Combined results indicated that increasing feeding frequency gave the horses more control over their environment and improved their welfare.

Keywords: Automatic roughage feeding system, feeding frequency, group housing, aggression, time budget

21. Do horses benefit from provision of shade in hot, sunny weather, and do they prefer it?

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Housing that prevents horses from performing behaviors to maintain their own comfort may have consequences on their performance and interactions with humans. Studies of housing in relation to weather conditions have largely focused on winter environments, with limited mention of hot weather and shade use in summer. We present two studies that examined whether horses benefit from shade and if they would use shade when available during hot, sunny summers in Davis, CA. In each study, physiological measures included rectal temperature (RT), respiration rate (RR), skin temperature (SK), and water consumption. Behavioral measures included foraging, locomotion, and proximity to water. Ambient temperature (T_{amb}), relative humidity (RH), black globe temperature (T_{BGT}), soil temperature (T_{soil}), and solar radiation were recorded. Data were analyzed using Proc Mixed in SAS 9.3. Significance was considered when $P < 0.05$. To evaluate physiological and behavioral responses to shade, 12 horses were housed individually in either completely shaded (SH) or completely unshaded (SUN) pens, with 5 days of measurement and observation from 1200-1800 h for each treatment using a crossover design. Horses in SUN showed greater RT, RR, and SK, stood near the water in more observations, and consumed more water than horses in SH. The RT was consistently greater in SUN than in SH at all hours, with the largest difference at midday when solar radiation peaked. To quantify the preference of horses for shade, 11 horses were housed individually for 5 to 7 days in pens with half the area shaded and the other half unshaded. Horses were observed in the shade in 7.1% more observations during daylight hours than would be expected by chance. Time of day was a significant factor, as horses were observed more often in the shade at midday, corresponding to peak solar radiation, and in late afternoon following peak T_{amb} and T_{BGT}. Future research should consider horses with compromised health, very old or young horses, or climates with high humidity and extreme temperatures. **Layperson's paragraph**: Given a choice, mature horses showed a preference for using shade under summer conditions. Shade provided significant physiological benefits even with limited use.

Keywords: Shade, environmental temperature, housing, behavior, welfare

22. Effect of T-Touch on behavior of Saddle Horses

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Tellington method (T-Touch®) is usually practiced in the equine field with the goal to improve equine welfare and the relationship between rider and his horse. To our knowledge this is the first scientific work on this topic. The effects of T-Touch® on the behavior of 20 saddle horses (aged 6-18 years) were investigated; no subjects had previous experience with this technique. Horses were studied in 3 situations lasting 20 minutes each: T-Touch, massage/petting (M/P), resting (R). All phases were recorded by a video-camera. The frequency of the following behaviors was scored: autogrooming, deep breathing, relaxing of the neck, kicking, pawing, licking/chewing, head tossing, biting and lateral/forward/ backward movements. The videos were analyzed by 10 persons, 5 Scientifics and 5 not, using a Behavioral Score (BS) from 1 (highly negative response) to 5 (highly positive response). GLM analyses for repeated measures revealed a significant main effect of the following behaviors: autogrooming $F_{(2,38)}=9.016$, $P<0.01$; deep breathing $F_{(2,38)}=4.01$, $P=0.02$; neck relaxing $F_{(2,38)}=12.904$, $P<0.01$; $F_{(2,38)}=9.016$, $P<0.01$; kicking $F_{(2,38)}=3.301$, $P=0.04$; pawing $F_{(2,38)}=4.594$, $P=0.01$ and licking $F_{(2,38)}=3.715$, $P=0.03$. Post-hoc analyses (Fisher's Protected LSD) revealed that autogrooming and neck relaxing behaviors were higher during T-Touch than R ($P<0.01$) and M/P ($P<0.05$); in addition, pawing occurrence was higher during R respect to M/P ($P<0.05$) while kicking frequency was higher during M/P respect to R ($P<0.05$). Finally, the highest frequency of licking was achieved during R ($P<0.05$) and the lowest frequency of deep breathing was measured during M/P (M/P vs T-Touch $P<0.01$; M/P vs R $P<0.05$). Regarding the BS, results clearly showed that horses appeared more relaxed during the T-Touch procedure respect to massage/petting ($t(18)=7.742$, $P<0.00$). In general our results showed that T-Touch® was positively accepted by saddle horses without eliciting any aggressive behavioral responses. Further studies need to more deeply understand the effects of T-Touch on endocrinal and physiological parameters.

Layperson's paragraph:
During T-Touch horses didn't show any aggressive behaviors & showed more relaxing of the neck, deep breathing & autogrooming compared with the petting and resting situations; this technique could improve equine welfare and rider-horse relationship.

Keywords: Tellington method, T-Touch, horse behavior, equine welfare, massage

23. Novelty seeking and startle response in adult domesticated horses

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The scope of responses to novelty in horses includes instinctive flight, neutral or curious responses. Therefore, studying temperament, including one of its key components, response to novelty, has important impact on equine welfare and the human-horse relationship. We measured the behavior of adult domestic horses (*N* = 46; 25 mares, 21 geldings, 3-29 years, Thoroughbred *n* = 16, Quarter Horse *n* = 16). Prior to the first novel object test, the researcher, unfamiliar to the horses, entered the pen and rated each response for approach using a 5-point scale. We designed 3 differently shaped novel objects. The 3 novel objects were a ball (65 cm), a saucer and a hollow cube. The researcher calmly placed the objects into the horses' home pen and then exited. We video recorded 10 minutes to observe behavior responses. We employed mixed model ANOVAs to test effects of age, sex, breed, sociability rating toward a novel human, individual horse as a random effect, and type of novel object. Trial order had no effect on startle rate, but the type of novel object was significant. The saucer was associated with significantly more startles than the ball ($p < 0$ .001). 12 Horses startled once, two twice, one 3 times and one 4 times, interestingly 30 of the 46 horses never startled. Thoroughbreds did not startle significantly more than Quarter Horses. We found that horses that startled had much quicker latencies ($p < 0.001$). In our study startling was rare; however, the horses that startled the most tended to investigate the object most quickly. The novelty paradox is the finding that the horse most likely to startle when presented suddenly with a novel stimulus, is often the very same individual who will curiously investigate, if able to approach voluntarily. Although we didn't evaluate the novelty paradox literally as it is written, the general idea of the novelty paradox was supported by our data.

Layperson's paragraph: We studied the behavior responses of 46 horses to 3 novel objects (saucer, ball, cube). Startling was rare; however, the type of object mattered and horses that startled the most tended to investigate the object most quickly.

Keywords: Welfare, temperament, novel object test, startle response, novelty paradox

24. Novelty-seeking and object play behavior in adult domestic horses

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Welfare of horses in captivity depends on many factors, including temperament. A key part of temperament is response to novelty; horses vary in fear and curiosity. Horses may have undergone behavioral neotenization (retention of juvenile traits through adulthood) via domestication. If so, accommodating juvenile-like traits such as curiosity could potentially improve well-being of adults. To complement prior temperament research that tested horses individually, we presented 3 novel objects to horses (total N = 46, ages 3-29 yrs), housed in same-sex (mare or gelding) social groups. A ball, plastic saucer, and hollow cube were placed into horses' home pens in counterbalanced order for 10-minute videotaped trials. We quantified latency to approach and duration of investigation, and used mixed model ANOVAs to test age, sex, breed, sociability rating toward a novel human, individual horse (random effect), and type of object. Duration of investigation was the most predictable behavior, $R^2 = .79$. Age was inversely correlated with duration, $F(1,38) = 18.77$, $p = 0.0001$. Sociability rating was directly correlated with duration $F(3,38) = 4.42$, $p = 0.01$. The 'individual horse' effect accounted for 21% of the variance. The cube (deconstructable) was interacted with longer than the ball $F(2,86) = 7.89$, $p = 0.0007$, notable for horse enrichment design. Although adult mares rarely play socially, here mares' play behavior was statistically indistinguishable from geldings', supporting social and object-directed play as two distinct constructs. Although there was an overall age effect, with older horses investigating and playing less, on average, than younger ones, there was, notably, also high behavioral variability. Observations that at least some aged individuals' behavior was within the same quantitative ranges as the youngest adults provides initial empirical evidence to support the hypothesis of behavioral neoteny in domestic horses.
Layperson's paragraph: The purpose of play in adult animals is not fully understood. We found that mares and geldings responded remarkably similarly (given that adult mares rarely play socially) to novel objects. Even in older horses, there was high variability of investigation and play behavior.

Keywords: Temperament, novel object test, play, neoteny

25. The use of temperament tests for the evaluation of police horses.

Marc Pierard*, Geert Verbeke, and Rony Geers, *Katholieke Universiteit Leuven*, *Leuven, Belgium*.

The Belgian federal mounted police wants to objectify the selection procedures for horses. The first phase was a program of temperament tests on 48 active police horses, all warmbloods, with a mean age of 12 years (5-21 years) and a mean of 8 years of service with the police (1-18 years). The custom made program included an arena test, motionless person test, approaching human test, bridge test, sudden object test, sudden noise test and a gregariousness test (second horse in separate part of arena for 2min). The test program took about 35 min in an indoor arena and was filmed. The arena, motionless person, sudden object, sudden noise and the gregariousness test were analyzed in detail using Observer. The other tests were given a score from 1 to 5, 1 being the least reactive response. The police provided their subjective evaluation on the suitability as a police horse. A Wilcoxon rank sum test between well suited and less suited horses was performed to see if subjective suitability was reflected in behavioral measurements. In the arena test well suited horses had longer bouts of canter ($p=0.028$). In the sudden object test the less suited horses had a higher proportion of time trotting ($p=0.031$). In the sudden noise test less suited horses had a higher proportion of time trotting ($p=0.041$), shorter bouts of standing ($p=0.029$) and a lower proportion of time standing ($p=0.047$). Good horses had a lower score on the 5 point scale for leading the horse out at the end of the entire test ($p=0.008$). The point scores for the bridge tests over a wooden plank and a blue tarp were significantly, but moderately correlated ($r_s=0.57$, $p<0.0001$). When we tested for correlations across tests, we found a significant correlation for most behaviors between the arena and the gregariousness test. Several behaviors showed a significant correlation between the sudden object and the sudden noise test. This initial study provides a framework to evaluate new horses and to refine the methodology. It shows that subjective evaluation is not strongly linked to behavior measurements.

Layperson's paragraph: The mounted police would like to use objective measurements to evaluate the suitability of horses for police work. A comprehensive test program on 48 police horses helped to look for the most useful measurements. Selecting better suited horses will improve horse welfare and rider safety.

Keywords: Police horses, selection, temperament test

26. Arousal, attachment and affective state

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Affective states and arousal levels may correlate with behavioral outcomes, so we see the need to explore the influence of both affective state and arousal on behavioral responses to operant conditioning. The horse's need for safety may motivate a variety of unwelcome responses, including excessive arousal. This paper provides a framework for assessing how affective state and arousal may influence the efficacy of operant training methods. It presents a series of three-dimensional conceptual graphs as exemplars to describe putative influences of both affective state and arousal on the likelihood of horses performing commonly desired behaviors. These graphs are referred to as response landscapes. Response landscapes highlight the likely need for different approaches to suit animals in different affective states and at various levels of arousal. Beyond learning strategies such as positive reinforcement, attachment theory has long been established as the most salient socially cohesive phenomenon between human infants and caregivers. Recently, it has been extended to account for manifestations of adult human relationships and human-animal relationships. We explore this phenomenon within horse-human relationships by investigating the horse's fundamental need for security through social cohesion. These needs are implied by the horse's relatively large amygdala and, as an antidote to the physiological manifestation of anxiety, by the effect of tactile stimuli applied at a discrete cervical region which lowers the horse's heart rate and likely, reduces fearfulness or insecurity. Being in the presence of an attachment figure may help to reduce arousal and bring about a positive affective state. Furthermore, the highly prized attribute of trust in animal–trainer dyads may be, at times at least, a manifestation of trainers as safety signals and attachment figures. Similarly, animals said to have confidence in and need for their handlers may value the relative safety those humans afford or represent.

Layperson's paragraph

The science of operant conditioning can be best applied if we factor in the roles of arousal (e.g., levels of excitement) and affective state (how the horse may be feeling). Operant conditioning can also be complemented by psychological constructs that allow us to explore the role of humans as attachment figures (sources of support) for horses.

Keywords: Arousal, attachment, affective state, calmness, trust, confidence

27. Who's in a better mood? Comparison of behavioral indicators in horses trained with negative or positive reinforcement

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Traditionally, horses are trained using negative reinforcement (NR). Recently, methods integrating positive reinforcement (PR; e.g. clicker training) have become more common. This study aimed to compare the effect of NR and PR on horse affective states, using well known behavioral and physiological indicators. Over a 5-day period, 12 mares were trained for 15 min/day using either NR (n=6) or PR (n=6) to achieve various tasks: lead in hand, stop, back up, lowering the head, walk on a tarp and stand on a platform. PR horses were trained using the clicker method and learned to follow a target. NR horses were exposed to a gradual pressure intensity which was removed as soon as the expected response was shown. Shaping procedure was applied in both PR and NR. The horses' behavior was analyzed visually from videos of the training, using a one-zero sampling with 10 s intervals. Four parameters with 3 well-described descriptive levels were recorded: muscular tension (irritated; indifferent; motivated), ear position (backward; sideways; forward), attitude towards trainer (avoid contact; neutral; search contact), head position (low; middle; high). The proportion of occurrence for each parameter was calculated. Heart rate (HR) and its variability (RMSSD), respiration rate and skin temperature were recorded using a BioHarness™. Our results showed that during training, NR horses spent most of the time in an indifferent attitude (NR=69±2, PR=13±3, U=7, p<0.001). They also showed more irritated body tension, while PR horses expressed more motivated body tension. PR horses pointed their ears forward more often than NR horses (PR=42±2, NR=14±1, U=152, p<0.001).The latter had their ears backwards > half the time. PR horses were more likely to search contact with the trainer, whereas NR horses had a rather neutral attitude towards him. The physiological measures showed no differences between the groups. Behavioral observations suggested that horses trained with PR were in a more positive affective state than NR horses. Thus, the integration of PR in horse training may be beneficial for horse welfare.

Layperson's paragraph: While NR horses displayed a rather indifferent attitude towards the trainer, PR horses seemed to be in a more positive affective state.

Keywords: Affective state, horse, negative reinforcement, positive reinforcement

28. Assessment of horse optimism following negative or positive reinforcement

Sabrina Briefer Freymond*[1], Elodie Briefer[2], Anja Zollinger[1,3], Yveline Gindrat-von Allmen[3], Christa Wyss[1], and Iris Bachmann[1], [1]*Agroscope Liebefeld-Posieux Research Station ALP-Haras, Swiss National Stud Farm*, *Avenches, Switzerland*, [2]*Institute of Agricultural Sciences, ETH Zürich*, *Universitätstrasse 2, 8092 Zürich, Switzerland*, [3]*Bern University of Applied Sciences, Agricultural Science*, *Länggasse 85, 3052 Zollikofen, Switzerland*.

Positive mood triggers optimism, which leads to judge ambiguous stimuli as positive. In animals, judgement bias tests allow optimism/pessimism measurements, suggesting underlying moods. Our study aimed to develop a judgement bias test in horses, to assess the effect of negative (NR) or positive reinforcement (PR) training on emotional states. We predicted that NR would induce negative and PR positive emotion and mood. We trained 12 mares to discriminate between rewarded (+) and non-rewarded (-) locations situated on each side of a paddock. We then trained the mares for 5 days to perform exercises using either NR or PR (2 treatment groups). Emotions during training were assessed using physiological (heart rate and variability, respiration rate, skin temperature) and behavioral indicators (body tension, attitude towards the trainer, hear posture, ear positions). Finally, we assessed how NR and PR groups judged 3 ambiguous locations situated between the + and - locations. Our results show that, at the end of the judgement bias training, both groups could equally discriminate + and - locations. According to our predictions, behavioral measures of the training exercises showed that RN mares were in more negative postures than RP mares. Surprisingly, during the judgement bias test, RN mares reached the - location (45.3s) and the ambiguous location next to it (24.6s) faster than RP mares (79.0s and 83.3s; LMM: $p = 0.03$ and $p = 0.009$ respectively). This lower expectation of negative events suggests that RN mares were in a more optimistic mood than RP mares, despite experiencing negative emotions during the treatment. RN mares could have been more motivated to obtain a reward than RP mares, which had been rewarded throughout the treatment phase. Alternatively, RN mares could have developed an optimistic bias triggered by release from stress experienced during the treatment. This first attempt to test judgement bias in horses suggests that this is a promising method to measure horse mood, although further experiments are needed to validate the emotional states experienced by the animals during the tests.

Layperson's paragraph:
This study suggests that the judgement bias approach is a promising method to measure horse mood. Our findings raise interesting questions concerning the impact of the training method on horse emotions and moods.

Keywords: Emotional states, training method, cognitive bias

29. The force of whip impacts delivered by jockeys using forehand and backhand strikes

Paul McGreevy*, Lesley Hawson, and Andrew McLean, *University of Sydney*, *Sydney, NSW, Australia.*

The Australian Racing Board (ARB) makes a distinction under its Rules of Racing concerning whip use between forehand and backhand whip action that is critically important: prior to the final 100 meters of a race, the whip shall be used in a forehand manner neither in consecutive strides nor on more than 5 occasions. This seems to imply that backhand whip use is less closely scrutinized, which may have profound implications for horse welfare. We used pressure-detection pads to examine the force on impact of 288 whip strikes (left forehand, left backhand, right forehand, right backhand; n=72 each) in batches of 12 consecutive strikes by six right-handed jockeys based in Victoria, a state in which Thoroughbred racing is always conducted in a counter-clockwise direction. The mean latency (± S.E.M.) to complete each series of 12 strikes was 6.89s ± 0.44. The mean for force was 46.21 ± 2.03 N. Significant differences in force emerged between individual jockeys and in most interactions between jockey, hand and action. This highlights the problems the industry has in trying to enforce equity in whip use to satisfy punters while at the same time giving reassurances about horse welfare. The current results show that action (forehand versus backhand) does not influence force on impact when using the non-dominant hand. However, when using the dominant hand, these jockeys struck with more force in the backhand ($p=0.02$). This result challenges the current focus on welfare concerns around forehand whip strikes. It should inform any review of the rules around whip use since it may help to avoid any unjustified focus on either forehand or backhand whip use. This would help to inform the debate around levels of impact on fatigued horses when they are being struck for a perceived sporting gain.

Layperson's paragraph:
This study shows that whip action (forehand versus backhand) does not influence force on impact when using the non-dominant hand. However, when using the dominant hand, jockeys struck with more force in the backhand. This result challenges the current focus on welfare concerns around forehand whip strikes. Rules of racing that limit only forehand whip use cannot be relied up on to safeguard horse welfare.

Keywords: Horse, welfare, whip, pressure detection, laterality, forehand

30. Evaluation of whip use and prevalence in elite and non-elite show jumpers.

Catherine Watkins*[1] and Darcy Murphy[1], [1]*Hartpury College (UWE)*, *Gloucester*, [2]*Hartpury College (UWE)*, *Gloucester*.

The use of the whip and concern with equine welfare in the racing industry has filtered through to other equestrian disciplines; however, as yet, whip use has not been investigated in Show Jumping (SJ). Therefore the aims of this research were to establish whether a correlation exists between occurrence of whip use and performance, and whether this differs between competition levels. Direct observations of whip carriage, use, and rein release were made of n=229 non-elite (NE) (0.9-1.15m) and n= 229 elite (E) (1.2m +) at affiliated SJ competitions. NE riders had a higher prevalence of whip carriage (69%) compared with E riders (62%). Faults were 1.3 times more likely (p=0.0111) to occur if a whip was carried. A clear round was achieved by 22.7% of competitors who carried but did not use a whip, followed by non-carriers (15.7%) and whip users (7.4%). NE riders were more likely to use the whip (p=0.0002) and more likely to remove their hand from the rein (p=0.008). Data indicates that likelihood of faults increases with increased occurrence of whip use and suggests that British SJ could afford to review their whip rules to avoid unnecessary whip use in line with updated racing regulations. Education and training of riders is paramount to ensure NE riders do not over-use the whip and potentially implicate their horse's welfare. Further research could incorporate rider's perception of correct use and determine factors explaining why carrying a whip but not using it resulted in the most clear rounds to inform rule development and training techniques.

Layperson's paragraph: Whip use is prevalent in show jumping and this research shows that Increase use of the whip does not mean an increased chance of completing a successful clear round. The prevalence of whip use is higher in lower level competitors. BS rule currently do not protect horses from whip over use as currently written.

Keywords: Whip, show jumping, elite versus non-elite

31. A Comparison of Negative and Positive Reinforcement in Naïve Horses

Christina Bierke, Rebecca Meinen*, Erin Wilkens, Macy Leponiemi, and Kristina Hiney, *University of Wisconsin-River Falls*, *River Falls, WI, USA*.

The vast majority of horses are trained using operant conditioning, in which the subject's behaviors are shaped by its consequences. Behavior is modified using positive or negative reinforcement (PR and NR). Horses have traditionally been trained using primarily NR; however PR has recently gained in popularity. The aim of this study was to evaluate the effectiveness of these two training methods on horses exposed to a novel situation. Sixteen horses (8 yearlings and 8 weanlings) were blocked by age and randomly assigned into treatment groups of PR or NR. Horses were haltered and led one at a time into a stock trailer by the same person. The PR group was rewarded with grain when they took a step towards the trailer. The NR group had pressure applied by tapping a whip onto the horse's hindquarters. When the horse took a step forward the pressure was released. Progress was measured by the completion of six stages: 1) nose touching the trailer; 2) front feet at entrance of the trailer; 3) one front foot in the trailer; 4) second front foot in the trailer; 5) one hind foot, and 6) complete entry. Time to complete each stage was recorded and all tests were video recorded. Avoidance behaviors such as stepping sidewise or backwards, as well as investigative behaviors such as stretching the neck forward and sniffing were counted. The statistical analysis was calculated by the FREQ procedure of SAS (SAS, 2008) and the GLIMMIX procedure of SAS (SAS, 2008), with Pairwise t-tests protected with Tukey's test. No statistical differences were found between the treatment groups for time to completion of any stage. The number of avoidance behaviors were greater (side steps, $P< 0.05$; back steps, $P<0.05$) from 0-1 minute in the NR group. There were more investigative behaviors in the PR group ($P<0.05$) compared to the NR group throughout all six stages. Weanlings took more time to complete stage 1 than yearlings (28.0 sec. vs 13.8 sec., $P <0.05$).

Layperson's paragraph: Overall, no differences were found in loading time, heart rate, respiration rate or body temperature between horses in the negative reinforcement group compared to the positive reinforcement group. Therefore, both methods proved equally effective in young inexperienced horses with limited prior experience to handling.

Keywords: Reinforcement, behavior, training,

32. Exploring Clicker Training: A Method of Positive Reinforcement to Improve the Welfare of Horse Training

Olivia Turner*, *Anglia Ruskin University*, *Cambridge, UK*.

Clicker training is a method of positive reinforcement that is an effective application of learning theory in horse training however it is negatively viewed by some horse owners. It has been suggested that clearer criteria of clicker training may encourage more horse owners to use this type of training. The aim of this study was to determine the length of time required for horses to effectively condition to the clicker and whether a stable or ménage environment alters learning. Thirty horses were used for this study, one group were trained in a stable (n=15), the other in a ménage (n=15), horses were kept under the same management routines and were naive to clicker training. Training sessions were a maximum duration of 15 minutes with a 2 hour gap between each session. The primary reinforcers used for the training were chopped carrots kept in a pouch on the trainer. The first training stage conditioned horses to the clicker and a target stick (57cm) was used for the second training stage. Horses were considered conditioned to the clicker when they ceased nuzzling the pouch and were looking at the clicker. The second stage was target training and split into six steps by gradually moving the 57cm target stick up to 1 meter away which tested understanding of the task, time taken to complete the two stages of training was recorded. An Independent-Samples *t*-test was used to investigate the effect of the training areas on the training times of horses for both stages of training. A Mann-Whitney U test was used to investigate the affect training area had on the training times of the horses for the target training steps. Horses took longer to condition to the clicker when trained in the stable than in the ménage ($t28=2.804$, $P=0.009$). There were no significant differences between the two areas and the training times of the horses ($t28=0.839$, $P=0.409$) the difference between the stable and ménage training medians was 177 (Hodges and Lemen 95% CI= [470, 73.2]).

Layperson's paragraph: Findings suggest a 15 minute session is required for horses to effectively condition to the clicker prior to any further clicker training. This study highlights the individual learning differences in horses that need to be appreciated during training, suggesting that clicker training may be beneficial to some horses more than others.

Keywords: Clicker training, learning theory, equine welfare

33. Does the human voice have a calming effect on horses?

Katrina Merkies*[1], Helen MacGregor[1], Marieka Ouimette[1], Emily Bogart[2], and Kayla Miraglia[1], [1]*University of Guelph*, *Guelph, ON, Canada*, [2]*Agrocampus Rennes*, *Rennes, France*.

Anecdotally it is believed that speaking in a calm voice will inspire calm behavior in the horse. Eight draft horses (6-11 years) were placed individually in a round pen (10m in diameter) and allowed to move freely. Behaviors and heart rates (HR) were monitored every 5sec to obtain baseline readings. After 5min, a familiar human approached the round pen and stood 1m away from the fence. Simultaneously, one of four voice recordings was played (PL – pleasant voice low tone; PH – pleasant voice high tone; SL – stern voice low tone; SH – stern voice high tone) for a duration of 10sec. During treatment and for 10sec following, behaviors were noted every second. Control treatments consisted of a human present with no sound, or sound present with no human. Behaviors were scored for gait (1=halt; 2=walk; 3=trot; 4=run), head position (1=below withers; 2=even with withers; 3=above withers), ear position (1=toward human; 2=away from human), and body position (1=toward human; 2=perpendicular to human; 3=away from human). Mean behavior scores and HR were analyzed using a Mixed Model, and differences among treatments were determined using Tukey's Honest Significant Difference. Horses moved at a faster gait when a SL voice was played ($P=0.0316$), and reduced movement when PL was played ($P=0.0004$). Horses carried their head lowest when no human or sound was present, but all horses raised their heads in the presence of a human or a sound ($p<0.0001$). Horses oriented their body toward the human more often when a pleasant tone was played ($p<0.0001$). There was no treatment effect on ear position ($P=0.47$), but horses oriented their ears more toward the sound if the human was present ($P=0.044$). The presence of a human alone did not increase horse HR ($P=0.87$), but paired with any sound, HR did increase, with the greatest effect in SL ($P<0.0001$). These results indicate that horses appear less distressed when a human is present speaking in a pleasant voice, and show more distress if a stern voice is heard, particularly in a low tone.

Layperson's paragraph: The horseman's tenet that speaking in a calm voice helps to calm the horse appears to be true. This is important knowledge for horse trainers and facilitators working with students around horses.

Keywords: Sound, horse-human interaction

34. Does groundwork according to learning theory affect unwanted behavior of riding school horses during regular lessons?

Marc Pierard*[1] and Maaike Vincke[2], [1]*Katholieke Universiteit Leuven*, *Leuven, Belgium*, [2]*Katholieke Hogeschool Sint-Lieven*, *Sint-Niklaas, Belgium*.

Riding school horses are ridden by different, often inexperienced riders. Inconsistent riding can lead to undesirable responses in the horses. It is economically not viable to give these horses regular periods off work to retrain correct responses. This study looked at the influence of short groundwork sessions without changing normal work on the prevalence of unwanted behaviors during group lessons. We observed 8 riding school horses and ponies (mean age 10.4 years, range 4-18). Level of lessons and riders varied from beginner to intermediate. Each horse was observed during 2 lessons before the extra training in-hand and 2 lessons at the end of the extra training. Every horse was followed only with its assigned rider, in the same lesson with the same instructor. There were 3 different instructors. The lessons were held in their familiar indoor arena of 20 by 40 m. The 6 to 9 sessions of additional groundwork by the experimenter, about 20min per horse once a week, was done in the same arena and consisted of using learning theory (habituation, negative and positive reinforcement) to retrain the basic responses (habituation to whip, go, stop, turn, yield, park). The ethogram included 14 unwanted behaviors. The data were analyzed with mixed linear models. For all the horses together, only tail swishing decreased significantly in frequency ($p=0.001$). Analyzing all behaviors for each horse separately, 4 horses showed a significant overall decrease in frequency ($p<0.05$), 1 had 5 behaviors with a significant decrease but a non-significant overall decrease, 1 had a non-significant total increase and 2 had a significant overall increase. The variation in horses, riders, instructors and lessons, makes interpretation complex. The significant decrease in 5 horses (4 overall and 1 for 5 separate behaviors) and the big improvement in stimulus control reported by several riders, indicate that further work would be useful.

Layperson's paragraph: Riding school horses need training to maintain their rideability. We tested the use of short groundwork sessions based on scientific learning principles without interrupting the normal work schedule for the horses. Even with differences between horses, riders, instructors and lessons, 5 of the 8 horses showed a clear decrease of unwanted behaviors during lessons.

Keywords: Riding school horses, conflict behavior, learning theory

35. *Poster - Coach Feedback Type in Relation to Rider Perception and effects on overall performance*

Grace Kennerley*, *Myerscough College*, *Preston, Lancashire, United Kingdom*.

Coach feedback is a response intended to provide useful information and can be in the form of vocabulary. Verbal feedback is suggested to be the most influential aspect when considering athlete development, performance and coach- athlete relationship. Equestrian coach type is determined by coaching background and education. Background can influence feedback type spoken predominantly by coach. There is little evidence to show which feedback type is used mostly by equestrian coach type and whether riders can fully understand feedback. Study aims were to define what type of feedback strategy is used mostly in group equitation lessons. It also aimed to compare riders' perceptions of the type of feedback used against the actual feedback given and to discover if types of instructor differ in feedback type.
Male and female, varied aged and type (3 x BHS, 3 x Non-BHS) of riding instructors (n=6) were observed whilst teaching a group of participating riders for 1 hour. Feedback occurrence and type was recorded through a logging system. Feedback type was categorized as corrective, positive and punishment. Male and female, varied aged novice level horse riders (n=43) completed a Task or Ego Orientation Sports Questionnaire (TEOSQ) and a 5 point Likert scale based questionnaire to collect feedback perception and to identify variables affecting rider perception of feedback. Kruskal Wallis and Kappa analysis were used to test feedback median and association of agreement between feedback types used by coach and rider perception of feedback. Coach interviews also determined any variables that could reflect reason of feedback choice. Results indicated that BHS coaches use more corrective feedback than Non-BHS coaches ($P<0.001$). Rider's perceptions of the feedback type they received predominantly did not agree with the measured feedback type distributed by the coaches ($P>0.005$).

Layperson's paragraph: Overall BHS coaches tend to give large amounts of instructive information to their pupils; thus due to education through the BHS qualification framework. Feedback perception is mainly misunderstood in study riders thus affecting rider development and optimal performance. Coaches need to be educated in how to deliver feedback effectively. This also highlights that equestrian coaching systems need to reviewed regularly.

Keywords: Feedback, coach, perception, performance, rider, equestrianism

36. Poster - The path to success: career development in equestrian coaching

Inga Wolframm*[1], Silke de Bruijn[1], Josephine Barron[2], and Anne Hoogenboom[1], [1]*University of Applied Sciences Van Hall Larenstein*, *Wageningen, The Netherlands*, [2]*Jo Barron Coaching*, *Cornwall, United Kingdom*.

Researchers in coaching science agree that most top sports coaches follow similar "career" paths. They invest many years in their chosen sport, participate in advanced competition themselves, and, at the end of their active careers, pursue a career in coaching. Yet little empirical evidence exists regarding career development in equestrian sports coaching. Thus, this exploratory study aimed to examine a number of relevant factors relating to career paths of equestrian coaches. To that end an online survey was developed and distributed via social media, determining age at first involvement with equestrianism; years active in the sport, highest level ridden at (unofficial/no competitions; amateur sport; talent development squads, national squads, professional), hours spent coaching per week, years as coach, and highest level of coaching achieved (unofficial/no competitions; amateur sport; talent development squads, national squads, professional). The response rate was N=161 (female=140; male=17; unknown=4) from more than 15 countries. Participants' ages ranged from 19 to 70 years, with the largest percentage (28%) in the 31-40 years category. Dressage coaching was represented with 45.3%, while combined dressage and show jumping coaching was carried out by 19.9% of participants, followed by eventing (9.3%), showjumping (5.6%), Western (4.3%), leisure (3.1%), classical dressage (1.9%), long distance (1.2%), vaulting (1.2%) and other (8.1%). Spearman's Rho correlations were conducted to determine correlations between different variables. Most important results include significant correlations between highest coaching level achieved and highest level ridden at (r_s=.61; $p<0.001$); years active in the sport (r_s=.26; $p<0.001$); years as coach (r_s=.23; $p<0.005$); hours per week spent coaching (r_s=.28; $p<0.001$). Findings support the notion displayed in other sports that active experience and "know-how" of the sport-specific culture through time involved with the sport are important pre-requisites for forging a career in coaching. Further research into elements such as certification or educational background is recommended.

Layperson's paragraph: Findings suggest that more advanced equestrian coaches also have active competitive experience at higher levels, spent longer in the sport and are coaching more hours per week, enabling the continuous development of knowledge and skill.

Keywords: Equestrian, coaching, career

37. Poster – Talking horses at the grass roots: writing for horse people about equine science

Antonia Henderson*, *Langara College, Vancouver, British Columbia, Canada*

The goal of this project was to broaden the reach of academic publications to front line horse industry workers and owners. To this end, I published a series of six articles in two popular horse magazines. The “Horse Sport” readership is predominantly comprised of trainers and competitive amateurs from dressage, hunter/jumper, and eventing disciplines, while “Horse Canada” appeals to pleasure riders. I wanted to convey to those working directly with horses key messages from the scientific literature that would translate into direct welfare benefits for horses. Specifically, my aim was to:

- Make learning theory accessible to trainers so that they might incorporate principles of classical and operant conditioning into their current training regimes
- Introduce positive reinforcement training to owners and trainers for improving horses’ ground manners, addressing phobias, and fostering the human/equine bond
- Have horse professionals and owners understand the psychological needs of horses from an evolutionary perspective, and make management modifications that could better accommodate horses’ psychological needs
- Address the literature on equine cognition so as to replace antiquated notions of an animal’s “willingness to please”, and encourage trainers to set realistic goals for training

This presentation addresses a brief synopsis of each of these articles as well as a process focused discussion on the key issues pertinent to equine welfare and the challenges faced by academic writers in writing for lay audiences.

Layperson’s paragraph: This presentation outlines a series of six articles that were written for two horse magazines, “Horse Sport” and “Horse Canada” with the goal of reaching a popular, rather than academic, audience. Equitation science has much to offer owners and horse-professionals and thus has important implications for horses’ welfare. It was the goal of this project to reach this readership, make the science accessible, and offer some practical applications of training and management practices to enhance horses’ psychological well- being.

Keywords: Horse, equine, psychological wellbeing, equitation science, learning theory, education

38. Poster - Equine extracurricular activities affect student success in a university horsepProgram

Lacey Hubbs*, Dr. Rhonda Hoffman, and Dr. Warren Gill, *Middle Tennessee State University*, *Murfreesboro, TN USA*.

Previous studies indicate positive relationships between GPA and extracurricular activities (ECA), and identification with a mentor and retention. This study surveyed effects of ECA in Horse Science majors. Our hypothesis was that ECA participation would positively influence GPA and identification with a mentor.

A survey was administered to Horse Science majors in Spring 2013. The 26 questions included demographic data, ECA participation, self-reported GPA, length of commute, and whether students identified with a mentor. Data were analyzed using Pearson's correlation coefficients and PROC FREQ of SAS.

70 surveys were collected. As commute increased, GPA tended to decrease (R^2 = -0.23; P = 0.08); ECA decreased (R^2 = -0.42; P = 0.001); and identification with a mentor decreased (R^2 = -0.31; P = 0.02). There was no correlation between time spent studying and GPA, but students reporting <1 hr/wk skewed the data. A positive correlation (R^2 = 0.28; P = 0.04) was observed from 1 to 15 hr/wk studying and GPA. Total ECA positively correlated with mentor (R^2 = 0.34; P = 0.003) identification. A positive trend (R^2 = 0.26; P = 0.06) was found between ECA and GPA. Results suggest indicators of student success based on ECA involvement. A companion study will examine transcript data, which will be compared with self-reported student perceptions.

Keywords: Equine extracurricular activities, student retention, GPA

39. Poster - A Fly on the Wall: An ethnographic view of animal care and use

Karin Bump*, *Cazenovia College*, *Cazenovia, NY, USA*.

In 2000, Bernard Rollin noted that “for the first time in history, society was concerned with the 99% of animal cruelty that is not the result of deviant deliberate cruelty”. Determination of cruelty is often subjective and whether horses are in or out of training, a plethora of scenarios are present for interpretation. While it is critical to identify abuse, welfare concerns are heightened at a time when public understanding and familiarity with horses and other forms of livestock is low. The field of Social Sciences provides tools to understand how views regarding animals are shaped. These views are often built on concepts of legitimacy, and more often Moral Legitimacy, where activities are determined as ‘right and appropriate’ within a set of socially constructed norms (Boulding, 1974). For this study, a framework for evaluating legitimacy was applied in an ethnographic approach. The researcher was a participant in an international conference in ‘Animal Studies’ and was immersed within views of human-animal relationships from academicians primarily outside ‘Science’ based disciplines. Presentations covered a wide spectrum of animals such as Horses, Primates, Rats, Cattle, Transgenic Animals, and Taxidermied pets. Thematic views toward human-animal relationships showed genuine and generalized concern for the ways ‘non-human’ animals were frequently diminished. Discussion of ways humans used 'non-human animals' for trivial purposes and repressed their ability to express full genetic capacity as well as natural innate full-range behaviors occurred at length. Approaches to raising, housing, training and interacting with animals were often seen as going against their Telos. Discussion of legal protection, agency, and animal consciousness, as well as protecting and preserving animal dignity occurred. While it could be argued that this conference was a magnet for those with a particular mind-set toward animals, shifts in societal views towards animal care and use could suggest otherwise. Given this, it is important for the preservation and growth of Equitation Science (ES) to consider the views expressed during this study and how they impact on ES legitimacy. In addition, it is critical to recognize the seriousness with which this topic is embraced by those outside ‘Science- Based’ academic disciplines involved with animal care and use.

Keywords: Welfare, legitimacy

40. Poster - Impact of a new equine behavior and welfare course on student views of important equine welfare issues

Jessie Weir*[1] and Carissa Wickens[1], [1]*University of Delaware, Newark, DE, 19716*

Undergraduate students enrolled in a new (spring 2013) Equine Behavior and Welfare course investigated, presented, and discussed issues relevant to equine welfare. A variety of welfare issues including the unwanted horse issue, horse slaughter in the US, therapeutic drug use in racehorses, and the role of Rollkur in dressage were selected by the instructor and assigned to student groups. Each group was required to include a minimum of two, peer-reviewed journal articles, and to investigate both sides of the issue in their research. Pre and post course assessments were administered to gauge the effectiveness of the assignment in increasing student awareness of the issues and the impact on students' views of equine welfare. Response choices consisted of a Likert scale (1= strongly disagree to 5 = strongly agree). Twenty-three of 26 students completed the pre and post assessment. Based on the pre course assessment, most students were familiar with the unwanted horse issue (82.6%). Seventy-two percent were familiar with issues associated with horse slaughter in the US. Fifty-two percent indicated they were familiar with issues affecting the US horse racing industry. Level of familiarity with the Rollkur training method in dressage was low (8.7%). In the post course assessment, all students (100%) were familiar with the unwanted horse issue, issues affecting the US horse racing industry, and Rollkur in Dressage. Familiarity with horse slaughter in the US increased to 95.7%. Average scores for the questions "If an owner can no longer afford to keep their horse, it is acceptable to humanely euthanize the horse" and "Horses should not be slaughtered in the US" were 2.8 post versus 2.3 pre and 2.7 post versus 3.4 pre, respectively. Average scores for the questions "Therapeutic medications should be allowed in race horses" and "Rollkur should be banned from equestrian sport" were 3.0 post versus 2.8 pre and 4.2 versus 2.1, respectively. Results demonstrate the equine welfare issues assignment increased student awareness of equine welfare issues. Increased familiarity of the facts and challenges associated with the issues resulted in changes in student viewpoints.

Layperson's Message: Students applied their knowledge of equine behavior and welfare to the study of important welfare issues. Students learned equine welfare issues are extremely complex and that meaningful solutions require additional research as well as continued education and outreach efforts.

Keywords: Learning outcomes, horse welfare issues

41. Poster - The effect of leg preference and track direction on racehorse performance

Kevin Grills and Hayley Randle*, *Duchy College*, *Stoke Climsland. Callington. Cornwall UK PL17 8PB*.

Research into laterality preference in horses has demonstrated bias in both motor and sensory laterality. Leg preference may influence the way the horse behaves and consequently impact the success of their training. Awareness of motor bias (laterality) could improve the way horses are trained for competition and athletic performance and allow racehorse trainers to enter horses in races where track direction suits their individual laterality preferences. This study aimed to determine if leg preferent horses performed better on tracks whose direction matched the preferred leg. Pedometers were used to determine leg preference in 10 randomly selected thoroughbred racehorses between 3-10 years old whilst being exercised for 6furlongs (1207m) on all-weather woodchip training gallops. Pedometers were attached to each foreleg cannon bone, between the carpal bones and fetlock using brushing boots, at the start of the gallops and removed at the end where step data were recorded. The procedure was repeated three times per horse. Individuals' previous race positions for both left (anticlockwise) and right (clockwise) 'handed' race tracks were derived from the UK-based Racing Post Ratings and 'At the Races' website. Six of the 10 horses showed a preference for the left leg, three for the right leg whilst one individual did not show a preference. Neither horse leg preference nor track direction alone were significantly related to recorded performance (both Fs $P>0.05$), although together they were significantly related to previous performance ($F_{1,14} = 9.76$; $p<0.01$). On left handed (anticlockwise) tracks, left preferent horses took significantly more steps with the left foreleg than with the right foreleg. Conversely on right handed (clockwise) tracks, right preferent horses took significantly more steps with the right foreleg than with the left foreleg (all $P<0.05$). The matching of individual horses to particular tracks (direction) according to their leg preference has the potential to reduce injuries and potentially improve welfare in racehorses.

Layperson's paragraph: Knowledge of leg preference in racehorses can be used to match horses to tracks, therefore improve chances of success, reduce likelihood of injuries and consequently improve welfare.

Keywords: Racehorse, laterality, motor bias, track direction, performance, welfare

42. Poster - The relationship between whip use and final race position

Kevin Grills and Hayley Randle*, *Duchy College*, *Stoke Climsland, Callington, Cornwall,UK PL17 8PB*.

Welfare concerns have led to various welfare organizations demanding a ban on use of the whip in Thoroughbred horse racing. However practitioners regard the whip as an integral piece of equipment during race riding. Jockeys claim that the whip is needed both for occupational health and safety reasons and to encourage the horse to exert extra effort and perform to the best of its ability, especially towards the end of the race. There have been very few investigations of the relationship between whip use and performance. The British Horseracing Authority (BHA) have defined acceptable whip use and introduced new guidelines for its use. The whip can be used 7 times in Flat Racing and 8 times in National Hunt, as long as the horse is in contention, able to respond and given time to do so. This study aimed to determine if there was a link between whip use and a change in race position within the last 2 furlongs (400m) of a race. Post-hoc analysis of recordings of 422 horses in 50 UK races on all-weather tracks during January 2012 identified the counting of whip strikes administered to each horse. A total of 334 (79%) horses were whipped at least once, all of whom were technically 'in contention'. A significant relationship existed between the number of whip strikes between the 2furlong (400m) point and the finish line, and finishing position (r_{422}=-0.53; P<0.001; relative final position=0.752-0.08*number of hits, P<0.001; r-sqadj=27.5%). Final position was not attributable to whether the winners had been hit the same or more (n=30, 60%) or less (n= 20, 40%) times than other horses in the race (Chi^2_2=2.00; P>0.05). Finishing position was achieved regardless of how many times the horse was hit.

Layperson's paragraph: In general, winning horses received more whip strikes than losing horses during the last 400m of a race. Careful consideration of the motivating nature of whip strikes is required as at present it appears contrary to the principles of learning theory. This study supports the introduction of the new BHA whip rules.

Keywords: Racing, horse, whip, strike, position, welfare

43. Poster - Ear direction is related to jumping success

Katrina Merkies*, Teaghan Reid, and Samantha Seewald, *University of Guelph*, *Guelph, ON, Canada*.

Hearing in the horse is not only essential to survival as a prey animal, but is also instrumental in understanding the horse for the purposes of training and riding. Ear direction can be a strong indicator of a horse's response to a task. Ears perked forward normally indicate attentiveness however it could also be a sign of fear in the horse. Ears placed to the side may indicate relaxation or disinterest. Ears turned back may show attentiveness to the rider, while a horse with ears laid back suggests irritation or pain. Little research exists assessing ear direction relating to attention to predict behavioral responses to the rider or environment. This study attempted to correlate ear direction with the success of clearing a jump. Videos of 17 horse-rider combinations were evaluated over 22 jumping efforts in a single Grand Prix class. Ear direction was scored by two independent observers as forward, split (one ear forward, one ear back) or back upon take-off, over and landing after the jump. A mixed model analysis determined that ears positioned either back or split when over or landing after the jump was related to significantly more jumping faults at each obstacle ($p<0.001$). There was no effect on jumping faults when ears were positioned forward ($p>0.05$), and ear direction did not appear to have an effect upon take-off for the jump ($p>0.05$). Thus, ear direction appears to be a predictor of success in clearing a jump.

Layperson's paragraph: Horses that oriented their ears forward while going over a jump are more likely to clear the obstacle successfully than horses who orient their ears back or toward the rider. However ear direction on the approach to the jump does not correlate to jumping success.

Keywords: Ear position, jumping success, performance

44. Poster - A preliminary study on the effect of whip use on high and low speed index racing Quarter Horses

Katrina Merkies*, Nicole Durand, Kassie Joyce, and Cecilia Zegers, *University of Guelph*, *Guelph, ON, Canada*.

Quarter Horse racing is a high intensity sport requiring the horse to run short distances at a full gallop. Jockeys use tools such as strategy, stamina training, and the use of the crop/whip to increase horse speed and performance in the race. The Ontario Racing Commission (ORC) governs Quarter Horse racing rules in Ontario, and stipulates that only humane riding crops may be used to urge a horse, and the horse must be allowed time to respond before using the crop again. Other provinces and countries may also stipulate how many times a horse may be urged in a certain distance or segment of the race. The use of the crop/whip during Quarter Horse racing has created controversy regarding its humane application and the effectiveness at increasing the horses' speed. In Quarter Horse racing, horses are rated according to their speed index, which is calculated by adding or subtracting points according to their finishing time in relation to the average speed for that distance at that track. This provides a uniform comparison of horses that are raced at different tracks in different conditions. This study was undertaken to determine if speed index affects the way horses are urged during a race. Two horses with a low speed index (avg=56) and two horses with a high speed index (avg=86) were each observed in three different races and the number of crop/whip hits was recorded by three independent observers. A Student's T-Test determined that horses with a low speed index were hit more often than horses with a high speed index (9.2±2.3 hits versus 8.5±2.6 hits [mean#hits±SEM respectively]; $p=0.0003$). There was no correlation between the number of times a horse was hit and its placing in the race (Spearman -0.19; $p>0.05$). Slower horses appear to be hit more often than faster horses, however the more the horse is hit does not affect its racing time.

Layperson's paragraph: The use of the crop/whip in racing is an accepted form of urging the horse to run faster and thus finish better. However, the use of the crop/whip does not necessarily cause the horse to run faster, and horses that run slower are hit more often. This has distinct welfare implications, especially if urging does not appear to alter the final outcome of a race.

Keywords: Crop/whip use, Quarter Horse racing, speed index, performance

45. Poster - Perfect passage

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Passage is a complex movement described as a "measured, very collected, elevated and cadenced trot…characterized by a pronounced engagement of the hindquarters, a more accentuated flexion of the knees and hocks, and the graceful elasticity of the movement. Each diagonal pair of legs is raised and returned to the ground alternately. In principle, the height of the toe of the raised forefoot should be level with the middle of the cannon bone of the supporting foreleg. The toe of the raised hind foot should be slightly above the fetlock joint of the supporting hind leg."[1] This perfect ideal of passage presents a training and physiological challenge for the horse that may not be achievable. Five still frames of passage from each of three dressage tests performed by five horse-rider pairs during the 2010 World Equestrian games were observed. The height of the raised fore and hind foot in comparison to the contralateral leg were classified as below, equal to, or above the "FEI-ideal" positioning for that leg. Of the 74 still frames observed, there was a large variation in the quality of the steps, however the ideal passage was observed most frequently (27%). When considering only the front legs, 39.2% of the steps were above ideal, with the majority of these steps (66%) paired with hind leg elevation below ideal. No horse demonstrated a passage with both front and hind legs below ideal. Horses were inconsistent in their performance of passage, alternating between at least two, and generally three classifications (fore/hind legs high/at/below ideal) of leg elevation.

Layperson's paragraph: Passage is a difficult and important movement in Grand Prix dressage. Horses in competition more often perform passage with front leg elevation higher than required by the FEI rules accompanied by below-ideal hind leg elevation. Competitions are judged subjectively and riders may receive higher scores for flashier movements, which leads to inconsistency in the sport.

References

[1]FEI Rule Book 2011. RULES FOR DRESSAGE EVENTS. 24th edition, effective 1st January 2011. Federation Equestre International

Keywords: Dressage, passage, leg elevation

46. Poster - Upper body lateral deviation of horse riders, with unilateral leg movement, seated on a gym ball

Gillian Tabor and Hayley Randle*, *Duchy College*, *Stoke Climsland, Cornwall, UK*.

In order to avoid confusing the horse a rider must apply clear, independent signals when riding. A rider is considered to be in a good position when there is vertical ear-shoulder-hip-heel alignment and the spine is vertical with equal weight bearing through the pelvis on the saddle. Effective stimulus control can only be achieved if the rider is able to maintain a good position, particularly when applying the leg aids. Riders are increasingly advised to undertake training on gym balls to improve their position and balance based on the premise that gym balls provide an unstable surface to challenge and then strengthen the core muscles. This study assessed upper body lateral movement resulting from a single unilateral leg lift, used to replicate the application of a single leg aid, when seated on an unstable surface. Thirty-two riders, of mixed ability, sat on a 75cm ball with markers placed posteriorly at the spinal level of T2 and L5 were photographed from 2m posteriorly, whilst lifting the right leg, and then the left leg. ImageJ™ software was used to derive the deviation from vertical. Thirty-one (96.9%) riders tilted to the right when lifting the left leg and 32 riders (100%) tilted left when lifting the right leg. There was no significant difference in the deviation of the upper body to the left and to the right of vertical (left=4.46±2.73°, right=4.44±2.30°; $t_{32}=0.97$; $p>0.05$) indicating that riders sat on a gym ball did not exhibit asymmetry as documented in published research for riders on horses. It is therefore suggested that the single leg-lift exercise when sat on a gym ball may not be useful for challenging balance and hence training rider position.

Layperson's paragraph: Although riders tend to sit asymmetrically on horses the upper body movements of riders sat on a gym ball were symmetrical when doing single left lifts. Therefore this exercise may not be a useful for training position and improving the rider's ability to deliver clear signals to the horse.

Keywords: Rider position, gym ball, core muscles, training, stimulus control, signal

47. Poster - The effect of human body posture on horse behavior

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Natural horsemanship relies on human body language to communicate with horses. During round-penning, a human will face the horse with eye-on-eye contact as a driving aid, while turning away from the horse is an indicator for the horse to slow down. Twelve draft horses (age 6-15 years) were placed individually in a familiar round pen (10m in diameter) and allowed to move freely. Behaviors were monitored every 5sec for 5min of baseline readings followed by 5min of treatment. Each horse was exposed to six treatments in random order: a familiar (FAM) or unfamiliar (UNFAM) human entered the round pen and faced the horse's left girth, assuming one of the following postures: 1) head and shoulders facing horse's head (FRONT); 2) shoulders facing horse's head, head facing horse's hind end (AWAY); or 3) head and shoulders facing horse's hind end (REAR). Behaviors were scored retrospectively by two independent observers using video recordings to note gait (1=halt; 2=walk;3=trot; 4=run), head position (1=below withers; 2=even with withers; 3=above withers), ear position (1=toward human; 2=away from human), or body position (1=toward human; 2=perpendicular to human; 3=away from human). Mean behavior scores were analyzed using a Mixed Model, and differences among treatments were determined using Tukey's Honest Significant Difference. There was no difference between FAM and UNFAM in gait or head position ($p>0.22$). Horses moved at a faster gait with FRONT, and moved slower with AWAY ($p<0.027$). Horses carried their head lower with FRONT compared to control (no human; $p<0.0004$). There was no treatment effect on position ($p>0.19$) of the horse's body in relation to the human. However, horses oriented their body more toward UNFAM ($p<0.0013$), while their ears orient more toward FAM ($p<0.000$), particularly during REAR ($p<0.0005$).

Layperson's paragraph: Round-penning techniques utilize human body posture to elicit specific responses from the horse, including facing forward to drive the horse and turning away to slow the horse down. This research shows that horses move at a slower pace when the human is turned away from them. Horses tend to face unfamiliar humans, whereas they orient their ears more toward familiar humans.

Keywords: Human body posture, familiar/unfamiliar human, round pen

48. Poster - An update on the Equitarian Initiative – do working equids fit within the scope of equitation science? Camie Heleski*[1] and Amy McLean[2], *[1]Michigan State University,[2] North Carolina State University, USA*

There are an estimated 59 million horses worldwide & 54 million donkeys, mules & hinnies (FAO 2010). It is estimated that over 80% perform work for small shareholder families in developing areas of the world. Thus while we are most familiar with the performance (P) & leisure (L) equids in, e.g. USA (10 million horses; 52,000 donkeys; 28,000 mules & hinnies - majority used for P & L), the contrast would be, e.g. Ethiopia (5.7 million donkeys; 1.9 million horses; 385,000 mules & hinnies – majority used as working animals). Over the last few decades, an increasing number of projects have been developed with the aim of enhancing the welfare of working equids. In an effort to provide greater collaboration across various NGOs (e.g. SPANA, the Brooke, the Donkey Sanctuary, World Horse Welfare) & matching them with interested equitarians (people with the goal of enhancing equine welfare without personal gain, particularly for underserved populations), the Equitarian Initiative (EI) was formed as the brainchild of Drs. Jay Merriam & Dr. Julia Wilson with the support of the American Association of Equine Practitioners. During the past year, thousands of animals have been helped by EI members in the following countries: Dominican Republic, Nicaragua, Guatemala, Mexico, Costa Rica, Cuba, Haiti, Peru, Honduras etc. EI members are strongly encouraged to blog about their trips so that others might learn from their experiences. But to the question…do working equids have a place within the Equitation Science (ES) community? We suggest that they do. While to date most of the ES work has been focused on P & L horses, principles of ES, e.g. correct application of learning theory, have as much value for working equids as for P & L equids. Mission statements for both groups (EI & ISES) talk about enhancing the welfare of horses (& other equids). In the countries where we have been involved with working equids, we often see, among the many welfare problems, a tremendous need for improved understanding of how to fairly handle & train equids. Encouraging the use & understanding of ISES's eight Training Principles has as much potential for enhancing the welfare of working equids as P & L equids. **Layperson's paragraph**: Over 80% of the world's horses, donkeys, mules & hinnies are involved in work tasks for families in developing regions of the world. Embracing Equitation Science principles, such as the correct application of learning theory, has tremendous potential to enhance the welfare of working equids.

Keywords: Working equids, equitation science

49. Poster - Clever Hans one century later. Does a horse perceive human subtle cues? A pilot study

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When an arithmetical question was made, Clever Hans gave the right answer by tapping the ground with his hoof. It has been argued that he had learned an operant response between his behavioral outcomes and subtle cues of people around him. Why and how this would be possible is unclear. Could Hans perceive human emotional arousal by inadvertent subtle cues and could their disappearance be a reinforcer to stop tapping the hoof? In a pilot study an 8 years-old female trotter horse was tested in a room (4x4 m) with 13 female and 5 male human subjects in a random sequence. The person was required to sit on a chair and stay passive for 5-min while the horse moved freely in the room. The horse could explore/touch the person. For safety reasons the person was free to look at the horse and to avoid its contact if wanted. Speaking and/or making active hand movements were not allowed. By video-recording we gathered data about the mean length (mExp, seconds), the total time (tExp, seconds) and the frequency (number/min, fExp) of exploratory behavior of the horse towards the person and the frequency (fDB) of human subtle cues (displacement behaviors, Troisi 2002). Heart Rate Variability (SDRR and LF/HF, Von Borrel et al 2007) were collected by smartextile (Smartex™) and were normalized on basal value for humans and the horse. We found a negative correlation between equine SDRR and the fDB (r_s = -0.43, p = 0.0373). The horse also performed a higher mExp towards people who showed higher fDB (r_s = 0.41, p = 0.0472); whereas, the LF/HF of the horse lowered (indicating a vagal shift) when it performed higher fExp (r_s = -0.48, p = 0.0228). A positive correlation was also found between human SDRR and equine tExp (r_s = 0.53, p = 0.0125) and fExp (r_s = 0.66, p = 0.0019).

Layperson's paragraph: Although Hans' mystery remains unclear, these preliminary findings seem to indicate that our horse was able to perceive human subtle cues related to emotional arousal and this seemed to influence also the autonomous nervous system of both humans and the horse, as well as the horse's behavior. Further investigations are needed to verify the presence of a possible emotional link between horses and humans.

Keywords: Horse, human, subtle cues, exploration, heart rate variability

50. Poster - Healing the Troubled Horse: A Phenomenological Study of Horsemanship

Danielle Charis Hawkyard*, *The Royal Agricultural College*, *Cirencester, Gloucestershire, England*.

This research sets out to challenge the widely held belief that human domination of the horse is a requirement of good horsemanship, and is necessary to gain a horse's respect, while exploring the potential damage that the use of dominance may cause to equine psychologies and the horse-human relationship. It provides initial insight into how the horse-human relationship may function on a more mutual level, and how a relationship built on trust can help heal the damage inflicted by dominance. The study commences with an examination of the dominance theory of horsemanship, in which it is related to authoritarian theories of leadership in the field of organization studies, with which it shares many parallels. Research on the implications of authoritarian leadership for subordinates is used to provide an understanding of what the use of dominance theory means for horses. Phenomenological, narrative and reflexive research designs form the basis for the rest of the thesis. In a self-analysis of my experiences with horses and dominance theory, portrayed in a series of autobiographical 'critical incidents' written in the first person, I lay claim to my embodied knowledge of horsemanship. This is followed by the narratives ("stories lived and told") of two troubled horses who suffered at the hands of dominance, force, control and coercion, but have since been psychologically rehabilitated; the narratives tell the life stories of these horses, and identify what events led them to become suspicious of humans, and the circumstances that aided their rehabilitation. Finally I have compiled two reflexive diaries spanning approximately four weeks, which detail the significant interactions between these horses and their primary careers, with the aim of establishing the 'living' nature of their current horse-human relationships and revealing the possibility of a horse-human relationship free of dominance. This attempt at unveiling lived experiences and embodied knowledge provides a tentative but robustly supported claim that a relationship in which respect is earned through forging a bond of trust is entirely possible, as well as being more mutually beneficial for both parties. These findings add weight to an alternative paradigm for horsemanship, in which dominance is not a requirement.

Keywords: Dominance theory, embodied knowledge, horse-human relationship, narrative inquiry, phenomenology, reflexive research

51. Poster - The effect of feeding management on crib-biting frequency and duration

Louise Nicholls*, *Warwickshire College*, *Warwickshire, UK*.

Crib-biting is the most common stereotypical behavior in horses and is seen in approximately 5% of the domestic horse population. Furthermore, when limited forage is available and the horse has the desire and motivation to eat, this causes frustration and hence is a causal factor in the development of oral based stereotypes. The aim of this study was to investigate whether feeding forage before a concentrate feed would have a positive impact on crib-biting frequency and/or duration. Seven horses of mixed breed and gender with a mean age of 11±6 years were observed when forage was fed before concentrate (FC) and when concentrate was fed before forage (CF). Observations took place around the evening feeding. Frequency and duration of crib bouts were recorded for one hour before either forage or concentrate were provided, for 15 minutes in between forage and concentrate feeds or vice versa, and for one hour following the provision of the concentrate or forage. Following analysis, there was no significant ($P>0.05$) difference for crib-biting frequency between the two diets. However, the CF diet resulted in a significantly longer duration of crib bouts in between the two feeds ($P\leq0.01$) as well as during the hour after feeding ($P\leq0.05$). The feed bucket location significantly ($P<0.05$) decreased the total number of cribs observed during both feeding regimes. During the FC diet the location of the feed bucket also significantly decreased the duration of crib-biting bouts ($P\leq0.01$). Although crib-biting can be considered as a habit, adaptation of the feeding regime could help in the management of this behavior.

Layperson's paragraph: The study has revealed that by feeding the horse forage before their concentrate feed, the duration of crib-biting bouts in established crib-biting horses can be reduced. Furthermore, by placing the feed bucket as close to the hay as possible may help decrease the frequency and duration of crib-biting bouts

Keywords: Crib-biting, forage, concentrate

52. Poster - Effect of blankets on heat dissipation after exercise in unclipped and clipped riding horses

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Many horse owners routinely put blankets on horses with intact coat. Yet, the effects on heat dissipation during recovery have not been thoroughly studied. Therefore, we tested the hypothesis that blanketing delays recovery in both unclipped and clipped horses. Four Warmblood riding horses were studied during 6 consecutive days. Horses were used as their own control. The following treatments were tested: 1) unclipped, 2) unclipped with blanket, 3) half-clipped (trace clip: coat removed from belly and underside of the neck; hair left on head, topside of neck, body and legs), 4) half-clipped with blanket, 5) fully clipped, and 6) fully clipped with blanket. Horses were ridden in a standardized manner in an indoor arena. Blankets were put on horses during cooling down in walk and remained for one hour until test completion. Measurements of rectal temperature (RT), skin temperature (ST, neck and hindquarter), respiration rate (RR) and heart rate (HR) were taken as follows: before exercise in the horses' boxes, after 10-min warming up in walk (outdoors), at four stops during 5-min sequences of trot and gallop (indoor arena), after 10-min cooling down in walk (5-min in indoor arena, afterwards outdoors) and at intervals of 15-30 min during recovery in boxes until one hour after exercise. Data from post exercise are presented and were analyzed with Proc Mixed Model in SAS. Mean ambient temperature in the stable was 9.8±0.4°C and relative humidity 84.2±1.4% (Indoor arena: 4.9±0.8°C, 90.8±2.4%; Outdoors: 4.1±1.2°C, 92.0± 3.0 %). Skin temperatures of the hindquarter and neck did not differ significantly between treatments during cooling down in walk. However, horses with blankets had higher skin temperatures during recovery in boxes ($p>0.05$). HR was highest in unclipped horses with blankets during recovery ($p=0.03$). There was no effect of blankets on RT and RR ($p>0.05$). It is concluded that blanketing compromised heat dissipation after exercise and it was pronounced in unclipped horses.

Layperson's paragraph: This study demonstrated that putting blankets on horses after exercise compromised effective heat loss. Therefore, management practices such as blanketing should be considered wisely to avoid putting extra thermal load on horses during recovery from physical training.

Keywords: Equine, thermoregulation, shaving, blanket, training

53. Poster - Observation on the hematology of Standardbred horses in training and racing in Italy

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It is generally acknowledged that hematology may provide information about disease states, performance problems, but also about equine welfare and fitness in race horses. Hematologic data are available for horses in general, but most of them are referred to Thoroughbred horses reared in their native English countries.
Based on the assumption that age, sex, management, as well as and the geographical location of the breeding sites may affect the results of hematologic values, this study focused the attention on Standardbred trotters reared in Italy; then a trial protocol was established to check the amount of variation in the hematologic parameters and to calculate their reference intervals. Blood samples were collected from 100 healthy trotters, reared in different horse stables in Southern Italy. Hematologic parameters were screened and microscopic search for the parasites in the red cells was performed. Descriptive statistics were estimated for the hematologic data. In addition, variance analysis was performed by the GLM procedure including adjustment for gender and age. The results indicate that Standardbred trotters reared in Italy, when compared with normal blood values for horse in the literature, appear to be characterized by erythrocytes which are more in number, but smaller in size and lower in Hb content. Particularly, our average MCV and MCH are of 42 ± 2.62 fl and 15.50 ± 0.91 pg, while normal range reported in references are MCV=46.1 ± 4.0 fl and MCH=16.3 ± 1.4 pg.
Moreover in the present study, MCV was bigger in males than in females (42.42 vs 40, 79 fl; P=0.02) while MCHC was lower (36.87 vs 37.18 g/dl; P=0.04) and the effect of age was significant for RBC (P=0.0005), MCV (<0.0001) and MCH (<0.0001). Three years old trotters, in particular, reported higher number of RBC, but with lower MCV and MCH respect to adult horses (aged from 5 to 10 years). Conclusively this study provides new reference values useful for veterinarians and equine technicians practicing in Italy, to assess the welfare status of healthy trotters.

Layperson's paragraph: Based on these results a supplementation of iron and vitamin B should be suggested to improve equine welfare and performance particularly taking into account that Standardbred trotters may begin training for athletic competition while still growing.
Keywords: Hematology, Standarbred horse, race, gender, age

54. Valuing Thoroughbreds in the Australian recreational riding horse market

Paul McGreevy*[1], Catherine Oddie[2], Lesley Hawson[1], and Andrew McLean[1], [1]*University of Sydney*, *Sydney, NSW, Australia*, [2]*University of Newcastle*, *Newcastle, NSW, Australia*.

The purpose of this study was to describe the influences of safety descriptors and experience on the valuing of Thoroughbred (TB) horses for the adult recreational riding market. Research into the association between horse breed and specific behaviors supports the view that some breeds are more reactive than others. There is anecdotal evidence that TBs may be more likely than other breeds to show traits that compromise rider safety. Having been bred for speed and reactivity, TBs may have reduced habituation tendencies. In addition, those that have raced may have had more training to accelerate than to decelerate and as such may be predisposed to uncontrollable flight responses. We examined data from advertisements to determine which descriptors influence the price of TBs (n=220) entering the adult riding horse market. The average advertised price of $3286 for a TB was significantly cheaper than the average advertised price of a non-TB horse (n=524, $7384, $P < 0.001$). In contrast to the findings for the ponies and non-TBs previously reported using the same method, reassuring descriptors have a significant positive influence on price of TBs ($190 for every reassuring descriptor, $p=0.006$). The sum of the stated experience significantly enhanced price ($355 for every item of experience reported, $p<0.001$) but age and being advertised as a trail horse were associated with lower prices ($82 per year, $p=0.002$; $974, $p<0.001$, respectively). These data confirm that TBs are valued differently to other breeds in the Australian adult riding horse market.

Layperson's paragraph:
In comparison to non-Thoroughbreds, there are different influences on the pricing of Thoroughbred horses for the adult recreational riding market. A good horse-rider match is important in the context of equine welfare and Thoroughbreds appear to be less likely to be a good match for recreational riders. Further research for data on safety factors related to the breed and training of the horse is needed. Application of recently developed knowledge on breed-typical behavior could help recreational horse-riders make informed choices on the suitability of certain breeds for their requirements.

Keywords: Thoroughbred, recreational equitation, adult riding horse, safety, reactivity

55. Poster - Is horse head position used as an indicator of training in advertisements?

Kara Hutchings and Hayley Randle*, *Duchy College*, *Stoke Climsland, Cornwall, UK*.

The position of the horse's head in equitation has received much attention in the last decade particularly since the 2006 FEI workshop on the use of over bending (rollkür) in FEI competition. This study aimed to investigate the possible relationship between horse's head position and the descriptive words used in for sale advertisements. Images of 914 horses advertised on popular UK equine trading websites were examined from 01-14.05.12 inclusive. The following inclusion criteria were used to derive a sample population of images: for sale, a minimum of 142.2cm (14hh) and photographed whilst in motion from a viewpoint perpendicular to the horse. All head positions were initially rated using a subjective 5 point arbitrary scale developed specifically for this study from -2 indicating the head is in the rollkür position to +2 indicating a natural head carriage. The actual deviation of the head from the vertical was derived using ImageJ™ software and the descriptive words accompanying each image were also recorded. Of the 215 horses examined 70% were behind the vertical ($<90^{o}$), whilst 22% were in front of the vertical (>90%), with the remaining 8% being on the vertical ($=90^{o}$). Accuracy of the observers perception was confirmed by significant differences between the actual head angles derived for the different head position rating categories ($F_{4,210}=141.37$; $p<0.01$). Chi-squared goodness of fit tests confirmed the existence of associations between head position pictured and description given. The terms dressage, well-schooled, professionally-schooled, potential, sport horse, temperament, snaffle mouth and talented were linked with a behind the vertical head position (all $P<0.05$). Perception of the horses training is allied to head position. The use of a behind the vertical position to indicate a potentially higher level of training may be of welfare concern.

Layperson's paragraph: Horse head position in images is used in for sale advertisements to indicate level of training. Behind the vertical head positions are often accompanied by performance-related descriptors and worryingly may be used to indicate a greater level of training than actually exists.

Keywords: Horse, head position, rollkür, perception, image, descriptor

56. Poster - Validation of a simple method to quantify equine thoracolumbar posture

Gillian Tabor and Hayley Randle*, *Duchy College*, *Stoke Climsland, Cornwall, UK*.

Conformation and postural alignment of the equine spine are repeatedly assessed by Veterinarians, Physiotherapists, owners and trainers. Thoracolumbar spinal posture can be altered with physiotherapy treatment and rehabilitative training. Where the thoracolumbar spine is extended the spinal posture is described as lordotic (sway backed). Abnormal extension may contribute to soft tissue injuries and is implicated in the pathogenesis of over-riding dorsal spinous processes (kissing spines). Objective methods to analyze the spine, e.g. radiography, ultrasonography or scintigraphy, often have high costs and require extensive training for the clinician. A simple measure of spinal posture that is able to objectively quantify changes would be beneficial and allow assessment of changes in posture with treatment. This study aimed to assess the reliability of a simple method designed to objectively measure thoracolumbar posture. Six horses of mixed sex, age and breed were stood square, with neutral head/neck position (nose vertical with chin level with chest). A lateral photograph of horse (P1) was taken from 2m with a visible marker of known length in the frame. This procedure was repeated three times (P2 and P3) at 30 minute intervals for each horse. ImageJ™ software was used to measure the area between the dorsal thoracolumbar region and a straight line between highest point of withers and tuber sacrale, with the marker used to set the scale. P1 was measured three times, P2 and P3 measured once. The data were normally distributed and there was no significant difference in repeated measurement of P1 ($F_{2,15}=0.01$; $P>0.05$). No significant differences were seen between P1, P2 and P3 ($F_{2,15}=0.26$; $p>0.05$). This method could be used to evaluate changes in the thoracolumbar spinal posture of a horse undergoing a rehabilitation program following physiotherapy treatment for back pain and ultimately improve horse welfare.

Layperson's paragraph: The thoracolumbar posture of the horse's back has been related to back pain. Posture can alter over time and with rehabilitative physiotherapy treatment. The effect of treatment could be measured with expensive equipment but this study shows that a simple method could also be used to objectively quantify treatment effects.

Keywords: Equine, spine, posture, kissing spines, back pain, physiotherapy

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Glossary of Selected Equitation Science Terms

(Note – this is only a partial list from the original source; furthermore, some definitions are still undergoing review)

Original Source: McGreevy PD, McLean AN, Warren-Smith AK, Waran N, Goodwin D (2005) Defining the terms and processes associated with equitation. In: *Proceedings of the 1st International Equitation Science Symposium*, Australian Equine Behavior Centre, Melbourne, Australia, pp 10-43. http://www.equitationscience.com/proceedings

Aid: Any of the signals or cues used to elicit responses in horses. Rein, leg, whip and spur aids are initially learned through negative reinforcement and then transformed to light aids (light rein, light leg, voice, seat) via classical conditioning because of the temporal relation between the two. In traditional horsemanship, the aids are divided into two groups: the natural aids and the artificial aids. This distinction is misleading as it neither identifies nor correlates with the two different learning modalities through which the horse acquires its responses to the aids.

Artificial aids: Equipment used to alter a horse's behavior under-saddle or in- hand (e.g., whips, spurs). When employed correctly, these are generally used to negatively reinforce various locomotory responses and are most commonly used to fortify the light or natural aid to achieve the desired response. By convention, these are distinct from the natural aids since they do not involve direct use of parts of the rider's body.

Classical conditioning: The process whereby the unconditioned or conditioned response becomes elicited from a conditioned stimulus (Pavlov, 1927). In equitation it is the process where learned responses are elicited from more subtle versions of the same signal or to entirely new signals.

Collection: The progressive development of increased carrying power in the hindquarters of the horse. The resultant transfer of weight from the forequarters to the hindquarters allows the poll and withers to be carried higher, the hindquarters to drop slightly and the hind feet to step further forward and to carry more bodyweight with higher and shorter steps. This confers more power to the hindquarters, enabling the horse to perform more collected movements. In classical equitation, collection develops from repeated gait and stride length

transitions that occur in three beats of the rhythm. The combined effect of the transitions and the inertia of the animal result over time in changes in the horse's physique. The propulsion of the body is then in a more upward and forward direction giving greater cadence to the strides and increased lightness of the forehand (Anon, 1986). See also False collection.

Conflict behavior: A set of responses of varying duration that are usually characterized by hyper-reactivity and arise largely through confusion. In equitation, confusions that result in conflict behaviors may be caused by application of simultaneous opposing signals (such as go and stop/slow/step- back) such that the horse is unable to offer any learned responses sufficiently and is forced to endure discomfort from relentless rein and leg pressures. Attempts to flee the aversive situation result in hyper-reactivity. In addition, the desired response to one or both aids diminishes. Conflict behaviors may also result from one signal eliciting two or more responses independently, such as using the reins to achieve vertical flexion independently of the stop/slow/step-back response, or using a single rein to bend the neck of the horse independently of its previously conditioned turn response. Similarly, conflict behavior may result from incorrect negative reinforcement, such as the reinforcement of inconsistent responses, incorrect responses, no removal of pressure or no shaping of responses. Often referred to as evasions and resistances.

Connection: The contact of the rein, seat and leg. This contact may be absent (no connection), correct (an easily habituated light connection) or too strong (unendurable pressure).

Contact: The connection of the rider's hands to the horse's mouth, of the legs to the horse's sides and of the seat to the horse's back via the saddle. The topic of contact with both hand and leg generates considerable confusion related to the pressure that the horse should endure if the contact is deemed to be correct. In classical equitation, contact to the rein and rider's leg involves a light pressure (approximately 200 g) to the horse's lips/tongue and body, respectively. Although a light contact is the aim, there are brief moments, (seconds or parts of a second), when contact may need to be stronger, particularly at the start of training, or in re-training, to overcome resistances from the horse. Many contemporary horse trainers insist that the contact should be much heavier than a light connection. This view may cause progressive habituation leading to

learned helplessness to the rein and leg signals as a result of incorrect negative reinforcement and/or simultaneous application of the aids. Contact may therefore need to be the focus of discussion and debate.

Cue: An event that elicits a learned response. In equitation, cues are termed aids. These are learned through classical conditioning when a response comes increasingly under stimulus control.

Deep and round (rollkur): A modern tendency to train the horse to carry its head low and its cervical vertebrae maximally flexed (chin closer to the chest) in the belief that the hindquarters are engaged and that the activity and power of the hindlegs is improved. To critics, the deep and round technique is seen as a form of false collection and may have welfare implications.

Evading the bit: Oral behaviors (such as moving the tongue aborally) and neck postures (such as dorsoventral flexion) that enable horses to reduce the discomfort caused by bits or the extent to which riders can apply and maintain pressure. In training, these result from errors in negative reinforcement.

Evasions and resistances: Descriptive terms for conflict behaviors where evasions are similar to resistances, except that evasions refer to the more severe and violent behaviors. These terms arose because of the horse's natural tendency to avoid pressure/pain by learning through negative reinforcement to perform any attempted behavior that results in lessening of pressure/pain. The problem with these terms is that they imply malevolent and calculated behavior on the part of the horse whereas, in fact, these behaviors are more likely the result of errors in negative reinforcement. d respect need further investigation.

Go: The acceleration response in horse training that provides forward motion. The go response is trained via negative reinforcement using the rider's legs under-saddle and using anterior lead rein pressure when working a horse in- hand. Through classical conditioning, these responses are converted first to light versions of the leg or lead rein and then to the cues of seat, position and perhaps voice.

Habituation: The waning of a response to a repeated stimulus as a result of frequent exposure (not fatigue).

Hollow: Undesirable contraction of the vertebral column, so that the head comes up and the neck and back become slightly concave. The strides of the horse generally become faster and shorter ('choppy'). Habitual hollowness is usually a result of incorrect negative reinforcement and is frequently associated with conflict behaviors. Because of its reported association with activation of the HPA axis, hollowness should be further researched.

HPA axis (Hypothalamic–Pituitary–Adrenal axis): The physiological response to arousal, involving the limbic system, which stimulates the hypothalamus to produce corticotrophin releasing factor, which in turn stimulates the anterior pituitary gland to produce adrenocorticotrophic hormone, which then stimulates the adrenal cortex to secrete glucocorticoids.

Hyper-reactive behavior: Behaviors characteristic of an activated HPA axis and associated with various levels of arousal. Such behaviors typically involve the horse having a hollow posture and leg movements with increased activity and tempo, yet shorter strides. Hyper-reactive behaviors are quickly learned and resistant to extinction because of their adaptiveness in the equid ethogram. Behavioral evidence of hyper-reactivity ranges from postural tonus to responses such as shying, bolting, bucking and rearing.

Impulsion: The response of a horse that is correctly trained in its go/stop responses so that it moves forward energetically with a self-maintained rhythm, straightness and outline when signalled to do so. Impulsion is an early expression of the progressive development of collection, in which the animal progressively carries more weight on its hindquarters. There have been proposed to be three types of impulsion: 1. Instinctive - i.e., the inherited tendency to have more or less impulsion; 2. Mechanical - develops from Instinctive Impulsion and improves with work and gymnastic training; 3. Transmitted - that given to the horse by the rider in collecting the horse (Winnett, 1993). True impulsion, in which the horse conveys itself calmly under a light rein and without constant pressure from the rider, is distinct from states of general excitement in which the horse pulls at the bit and requires forceful restraint to be controlled.

In-hand: In a routine of schooling in-hand, the trainer works from the ground rather than from the saddle, positioned beside and/or behind the horse and controlling it with rein, voice and schooling whip.

In-hand work allows the horse to acquire signal response entities of go and stop as a prelude to foundation training, or during retraining or when training advanced movements.

Learned helplessness: A state in which an animal has learned not to respond to pressure or pain. Arises from inappropriate application of negative reinforcement, which results in the horse not being able to obtain release from aversive stimuli. If this continues over a period of time the horse will no longer make responses that were once appropriate. Learned helplessness has the following characteristics: a disinclination to trial behavioral responses to pressure; lowered levels of aggression; dullness; loss of appetite; physiological and immunological changes.

Lightness: A desirable quality that reflects self-carriage and the horse's self- maintenance of rhythm, straightness and outline. Lightness involves the bringing into action by the rider and the use by the horse of only those muscles necessary for the intended movement. Activity in any other muscle groups can create resistance and thus detract from the lightness.

Long and low: Training the horse to go with its poll extended and lowered and its neck slightly dorsoventrally flexed while attempting to achieve more activity and impulsion.

Natural aids: The body, seat, hands (reins), legs, weight and voice, as used to signal to the horse. Some of these aids are acquired via negative reinforcement (e.g., leg and rein responses), while others are acquired by classical conditioning (e.g., weight and voice aids). The distinction therefore is not based on learning theory.

Negative reinforcement: The subtraction of something aversive (such as pressure) to reward the desired response and thus lower the motivational drive (Skinner, 1953).

On the bit: The self-maintained neck and head position of the horse in correct schooling where vertical flexion of the cervical vertebrae and atlanto-occipital joint (also known as poll flexion or roundness) results in the nasal planum being approximately 6 degrees in front of the vertical or 12 degrees at walk. This posture is intended to improve the balance of the ridden horse (relocating extra weight to the hindquarters) and its willingness to respond to the signals transmitted by the rider through the reins. There are three precursors to the horse

being on the bit. The first is longitudinal flexion, followed by lateral flexion and finally vertical flexion. To most people, 'on the bit' means that the horse travels with its neck arched and nose tucked in. However, a vertical nose does not necessarily mean that the horse is on the bit. On the bit is necessary in horse training because, as a result of vertical flexion, the center of gravity shifts posteriorly toward the rider's center of gravity. There are various forms of false roundness where the horse is forced by the rider's hands or with the use of mechanical devices to flex his cervical vertebrae.

Operant conditioning: Training the horse to respond consistently to signals through positive reinforcement and negative reinforcement (Skinner 1938; McLean, 2003).

Outline (US shape, frame): An aspect of the horse's posture that refers to the curvature of the vertebral column and so encompasses the degree of flexion of the neck and poll and the associated flexion of the lumbosacral region. According to the ideals of equitation, the nasal planum should be no more than 12 degrees from the vertical at the walk and 6 degrees from the vertical at other gaits and never behind the vertical, because such a departure results in loss of self-carriage and lightness. The back should be soft and relaxed and give the impression of being raised.

Overface: Undertaking a task during riding or training that is beyond the horse's capacity or current experience.

Over-shadowing: The effect of two signals of different intensity being applied together, such that only the most intense will result in a learned response (Hull, 1943).

Positive reinforcement: The addition of something pleasant (a reinforcer) to reward the desired response and thus lower the motivational drive for that reinforcer (Skinner, 1953; McLean, 2003).

Progressive desensitization: A step-by-step weakening of an fear response to a given stimulus or set of stimuli to the point of extinction (McGreevy, 2004).

Punishment: The presentation of an aversive stimulus that decreases the likelihood of response or, in the case of negative punishment, the removal of a reinforcing stimulus. Punishment is often used incorrectly in horse training (i.e., when not contingent with

the offending response). Incorrect use of punishment can lower an animal's motivation to trial new responses, desensitize the animal to the punishing stimulus and create fearful associations (Mills, 1998a).

Reinforcement: The process in which a reinforcer follows a particular behavior so that the frequency (or probability) of that behavior increases (Wolpe, 1958; McGreevy, 2004).

Reinforcement schedule: The frequency of the reinforcers used in training the horse by the handler. The schedule may be continuous, intermittent or declining.

Reinforcer: An environmental change that increases the likelihood that an animal will make a particular response, i.e., a reward (positive reinforcer) or removal of an aversive stimulus (negative reinforcer).

Rollkur: See Deep and round.

Shaping: The successive approximation of a behavior toward a targeted desirable behavior through the consecutive training of one single quality of a response followed by the next. In horse training, a shaping program is known as a Training scale. Not paying due attention to shaping in horse training has been associated with conflict behaviors (Morgan, 1974; McLean, 2003).

Shying: The sudden hyper-reactive sideways leaping of the horse either from an aversive object it encounters or as an expression of conflict behavior that has arisen due to unresolved problems in negative reinforcement (e.g., when the contact is too strong). A shy begins with a turning away of the horse's forequarters followed by an acceleration response. Shying is frequently associated with other conflict behaviors and may be followed by bucking.

Signal: See Cue.

Stereotypy: A repeated, relatively invariant sequence of movements that has no function obvious to the observer. A number of stereotypic behaviors are seen in horses and are erroneously referred to as stable vices.

Stimulus: Any of the cues or signals used to elicit responses in horses. See Aid.

Stimulus control: The process by which a response becomes consistently elicited by a signal or cue.

Stress (acute and chronic): Stress, in its acute form, is a short-term dysfunction of the signal-response relationship presenting variously as raised tension levels, agonistic behaviors, redirected aggression and displacement activities. Chronic stress manifests as raised corticosteroid levels, physiological disturbances, gastric pathology, repetition and ritualisation of original conflict behaviors, redirected, ambivalent and displacement behaviors, development of stereotypies and injurious behaviors, such as self-mutilation and increased aggression (Wiepkema, 1987; Moberg and Mench, 2000).

A quick guide to statistics for non scientists

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The 'scientific process' comprises the six steps listed below. The application of statistics is a tool which enables reliable conclusions to be reached and the research objective to be answered. Statistical analysis is not that difficult and simply involves following a series of simple steps and rules. An example is used to demonstrate the steps needed for a simple scenario where the researcher needs to apply the two sample t test in order to statistically assess the difference between two sets of data. (All text relating to the example given is highlighted with grey shading.)

EXAMPLE. A study is planned to investigate the success of dressage horses trained using two different training methods (Method A and Method B).

1. **Generating a research question**
   A good project will have a simple title which clearly describes the objective of the study.

Is there a difference in the success of dressage horses trained using Method A and Method B?

2. **Identifying variables and measures**
   There are two types of variables – independent variables which are determined by the researcher and dependent variables which provide the measurements upon which statistical tests are conducted.

The Independent Variable is 'Training method' and has two levels: Method A and Method B.
The Dependent Variable is 'success' – which can be measured by scores achieved in competition.

3. **Formulating hypotheses**
   All research projects rely on the examination of hypotheses. Each statistical analysis relies on the simultaneous examination of a pair of hypotheses which are opposites of each other and always follow the standard format:

   The Null Hypothesis (Ho) states that *'There is no significant difference between A and B'*.
   The Alternative Hypothesis (Ha/H_1) states that '*There is a significant difference between A and B*'.

Ho: There is no significant difference in the dressage scores achieved by horses trained using Method A and the dressage scores achieved by horses trained using Method B.

Ha: There is significant difference in the dressage scores achieved by horses trained using Method A and the dressage scores achieved by horses trained using Method B.

4. **Designing the experiment ~ data collection**
   When designing an experiment it is important to obtain a decent sample size (n, as a rough guide is that anything less than 30 is considered to be a 'small' sample) and to match everything about the individuals contributing to each sample as evenly as possible.

All of the horse and rider combinations in this study will be competing at a similar level, and performing the same dressage test, under the same conditions, and be judged by the same judge.

5. Data analysis

Two types of data analysis are applied, first, exploratory, descriptive analysis which provides averages and an indication of the spread of the data, and second, confirmatory statistical analysis which yields 'test statistics' and probabilities and ultimately allows a statistical conclusion to be reached. The latter will then allow a conclusion to be reached in relation to the objective of the study.

Sample data (Dressage scores, %)

Method A

60	60	60	50	64	56	55	56	48	44	53	53	59
57	52	52	59	56	61	55	50	58	56	52	62	53
58	51											

Method B

60	73	69	67	72	67	65	64	64	72	64	72	61
70	74	61	63	66	68	66	72	70	68	55	87	60
68	69											

Confirmatory, statistical analysis ~ is necessary in order reach a reliable conclusion. A standard process is now followed:

- Conduct a statistical test (here the two sample t test). This will produce a test statistic and a probability value, P.

For this example: $t_{56}=8.40$; $P<0.001$.

6. Reach a conclusion

In statistics there is a one important number: **P=0.05**.

A P value of 0.05 means that if a study was repeated 100 times then 95 times out of 100 the same result would be found, and 5 times out of 100 the opposite result would be gained. As far as interpretation of results goes the P value should be less than 0.05 in order for the results to be considered to be reliable.

A simple procedure is followed to relate the P value to the hypotheses in order to reach a statistically sound conclusion:

- If the P value obtained is less than 0.05, the Ha is accepted and the Ho is rejected. The conclusion is then reached that there is a significant difference between the two samples. The averages found in exploratory data analysis show that training Method B is more successful than Method A.

- If the P value obtained is equal to, or greater than, 0.05, the Ho is accepted and the Ha is rejected. The conclusion is then reached that there is not a significant difference between the two samples. (Here scientists state that there is a non significant difference.)

This guide is intended to enable non –scientists to understand the statistical references made in the abstracts and presentations during the course of the ISES international conference.

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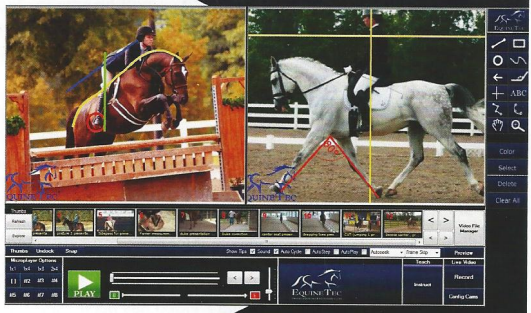


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