

The Impact of Animal Neglect on Human Welfare

Julia H. Wilson, DVM, Diplomate, ACVIM; Equitarian Initiative; Stillwater, MN, USA

Over centuries, horses, donkeys, and mules have played a critical role in human welfare and the evolution of civilization. Equids carry humans, pull wagons and plows, herd livestock, and more. In many impoverished regions of the world, an equid remains the main source of transportation for people, food, water, and materials which a family relies upon to live. Even partial loss of the equid's contribution to a family's income and daily work can be devastating to their welfare. Viewed through the lens of One Health, many neglect issues of working equids closely parallel those of the families that rely upon them and share common causes.

Human perception of the needs of working equids is far from uniform and varies across cultures, gender and age. Animal neglect can be the result of many factors including ignorance of its needs, lack of time or money to deliver care, paucity of essential resources such as feed, water, hoof care, functional harness, and health care. Common examples of neglect are malnutrition, excessive work without rest or water, poor hoof care and harness wounds. Diseases and parasitism might not be recognized and hence not treated. Neglect can also be intentional.

The greater the economic reliance of a family on its equid, the greater the impact of any reduction in its ability to work due to neglect. Children are most directly affected, physically and mentally. Reduction in family income leads to less food, poorer health, and too often, dropping out of school because of loss of transportation or inability to pay school fees. Too often, a malnourished donkey comes to an equid health clinic in the care of a malnourished child. If a child recognizes that the animal is suffering, especially if preventable, this is very stressful, even more so if the child perceives the equid as a friend. Families that have lost their "horsepower" in water-poor regions, require women and children to bear the heavy daily burden of fetching water for the household from distant wells. Loss of the working equid has also been shown to limit a family's ability to travel to medical care facilities.

Visible neglect or signs of abuse of an equid should trigger a concern for vulnerable family members. For example, pervasive alcoholism may lead to physical abuse directed at the equid and family members. Partnering with a human welfare organization in the community may enable social and medical services for otherwise invisible family members.

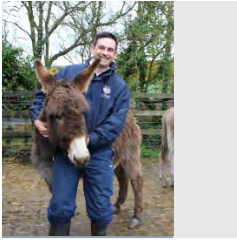
Uplifting working equid health through sustainable interventions will improve the welfare of the families that rely upon them.

Bibliography

1. Lane J. Links between working equid health and human livelihoods and health. Proceedings of the 61st Annual Convention of the American Association of Equine Practitioners, Las Vegas, Nevada, USA, December 5–9, 2015. American Association of Equine Practitioners (AAEP); 2015. pp. 301–304.
2. Luna D., Tadich, T. Why should human-animal interactions be included in research of working equids' welfare. *Animals* 2019, 9, 42; doi:10.3390/ani9020042
3. Dr. Julia Wilson graduated from Cornell University in 1978. She pursued an internship in large animal medicine at the Ontario Veterinary College followed by a residency at the University of Florida. She is a Diplomate of the American College of Veterinary Internal Medicine. She served the

majority of her career as a faculty member, first at the University of Florida and then the University of Minnesota. She now works as the Executive Director of the Minnesota Board of Veterinary Medicine. As an academic, beyond the joy of teaching and clinical work, her research focused on topics of neonatology, gastroenterology and infectious diseases. Dr. Wilson has served on the Board of Directors of the American Association of Equine Practitioners as well as on many AAEP Committees.

Dr. Wilson's international childhood, opportunities to lecture in other countries and experience on the Board of Directors of Heifer International led her to partner with Dr. Jay Merriam to create Equitarian Initiative, a U.S. non-profit organization that works to improve the health and welfare of working horses, donkeys and mules and the families that depend on them. This organization currently has programs in nine countries. Many include collaboration with local veterinary colleges to enhance the equine curriculum through teaching and provision of veterinary care in communities in need. She is currently on the Board of Directors of Brooke USA Foundation, another nonprofit organization that supports working equids. She is married to Tracy Turner, DVM, MS, DACVS, DACVSMR who shares her passion for international service.



Equine activities - social licence to operate.

Dr Joe Collins MVB PhD CSci CBiol FRSB MRCVS CertEP CertVR
Chief Veterinary Advisor at The Donkey Sanctuary

Social licence to operate (SLO) is an unwritten contract between society and those who pursue an activity. It arose in relation to industrial activities about which an increasingly aware public might have concerns – think mining for precious metals or burning fossil fuels to generate electricity. One such activity is the use of animals by humans to serve the latter's purpose, in ways ranging from slaughter for food to confinement for entertainment.

In the equine world SLO has largely been considered in the context of our use of horses for sporting purposes, in particular where such activities may place horses in the way of harm – think racing and eventing - in essence riding and jumping large obstacles at speed. In times past the approval of the general public, largely comprised of persons not engaged in the activity themselves, could be taken almost for granted, or perhaps not thought to matter. But attitudes change and the public's opinion does matter. Those involved directly in equine sports may consider otherwise; but I suggest that such an attitude is itself outdated and could at best be described as naïve. The state of an industry's SLO often determines its ability to operate with minimal formalised restrictions or constricting legislative provisions. Operating in such an environment should, in my opinion, be seen as an invaluable privilege, one to be guarded jealously and assiduously preserved.

Public attitudes toward animal welfare, and indeed animal rights, are changing and tolerance of animal welfare compromises (real or perceived) ever diminishing. Even if not funded by the public purse (and many equestrian activities are) we cannot ignore public perception and its view of 'acceptable use of equines'. Whether they like it or not, those who keep and use horses for sporting purposes are exposed to increasing scrutiny and more widespread criticism. (Blame social media if you wish.) The consequences of a loss of public confidence leading to loss of privilege can be readily seen in the removal of jumps racing from the calendar in South Australia and the horse phase in modern pentathlon following events at the Tokyo Olympics.

But I'd like to broaden discussion of SLO and equines to a consideration of other common uses of equines by humans in order to 'extract value' from them. Take the management of mares on 'blood farms' to harvest eCG-rich plasma; the product may be destined for a high return market in a highly regulated environment (such as the EU) but the raw material is often extracted from horses far away and not subject to similar standards of scrutiny or oversight. As the hormone yield falls pregnancies are aborted, often brutally (and we vets know how difficult this is to do in mid trimester). Similar considerations apply to the wholesale slaughter and global trade in donkeys simply so their skins can be used to make ejiao. The Donkey Sanctuary advocates for a moratorium on this senseless practice. The keeping of wild animals, including asses, in zoo cages and use of animals, including horses, in circuses is under increased scrutiny: loss of SLO leads to legislative restrictions and bans. What of 'equine-assisted activities' – the use of horses and donkeys in the service of human health - what's in it for them? What of equine welfare organisations keeping aging equines 'safe' in sanctuaries – is this always best for them? There is an increasing sense that we should look at matters more from their and not our perspective – fundamentally, what is it to be a horse or donkey?

'Working equids' is a category receiving some more positive consideration, as a sustainable alternative to fossil-fuel dependent power. But a category also not immune from criticism: I can vividly remember being berated on descending from a licensed horse-drawn carriage in a European city centre once and being

criticised publicly for tacitly 'endorsing' the use of equines for tourism activities. The EU Platform on Animal welfare, whose equines subgroup I chair, has engaged in developing official guidelines for such use. Not everyone agrees with this approach. But we do have donkeys carrying tourists up steep hillsides on Greek islands as there are mules carrying supplies for trekkers up the Andes. Guides, education, training, engagement represent the pragmatic approach. Does it render such activities immune from criticism – no! Could such scrutiny in the future lead to increased restriction and/or regulation – possibly! Such is the very definition of loss of Social Licence to Operate.

The veterinary profession itself should not, I believe, consider ourselves above the fray. We don't have a licence to operate with impunity, to do as we wish for reasons we alone choose. We must continue to examine the ethics of how we practice, of the surgical procedures we perform, of the life-prolonging treatments we apply, the medicines we supply, and ask ourselves – Why? Is this in the individual equine patient's interest? Is this 'advance' in treatment in the equine species' interest?

None of us, nor the equine-related activities we engage in, are immune from public scrutiny, from criticism (warranted, well-informed or not) and none should be complacent about the loss of SLO and what the consequences might be. Trust is everything – hard won but easily lost!

References

1. Social licence to operate: what can equestrian sports learn from other industries? J Douglas, R Owers, MLH Campbell - *Animals*, 2022; <https://www.mdpi.com/2076-2615/12/15/1987>
2. Social license and animal welfare: Developments from the past decade in Australia. JO Hampton, B Jones, PD McGreevy - *Animals*, 2020; <https://www.mdpi.com/2076-2615/10/12/2237>
3. Social License to Operate–Why Public Perception Matters for Horse Sport–Some Personal Reflections. CR Heleski - *Journal of Equine Veterinary Science*, 2023; <https://www.sciencedirect.com/science/article/abs/pii/S0737080623000576>
4. What is a social licence to operate? *World Horse Welfare*: <https://www.worldhorsewelfare.org/what-we-do/sport-and-leisure-horses/what-is-a-social-licence-to-operate>
5. Grand or not-so-grand National? The social licence and equestrianism conundrum, D Rendle, BEVA President; <https://www.veterinary-practice.com/article/social-licence-and-equestrianism>

Dr. Joe Collins MVB PhD CSci CBiol FSB MRCVS CertEP CertVR

Joe graduated from the School of Veterinary Medicine in Dublin in 1987. He has since worked in Ireland and the UK in private equine practice, as a clinical resident at Cambridge University Veterinary School, in the pharmaceutical industry and in the NGO sector. Joe is currently Chief Veterinary Advisor at The Donkey Sanctuary, a UK headquartered global NGO; an appointed expert at the EU Platform on Animal Welfare where he chairs their subgroup on the Welfare of Equids; a member of the EU Reference Centre on the Welfare of Animals subgroup on Working Equids; and chair of the EuroGroup for Animals Equines Working Group.

Joe has previously been President of Veterinary Ireland and FEEVA (the Federation of European Equine Veterinary Associations), and served on both BEVA Council and the Veterinary Council of Ireland. Joe holds a PhD in equine welfare and is a Chartered Scientist, Chartered Biologist and Fellow of the Royal Society of Biologists. His main interests are in equine welfare & protection, veterinary medicines and professional standards.



Practical approach to working equids welfare

Mariano Hernández Gil

MVZ MC

Facultad de Medicina Veterinaria y Zootecnia, Universidad Nacional Autónoma de México.

During work, one exerts innate or acquired abilities to achieve a purpose or result. Considering that a working animal is one whose faculties facilitate the accomplishment of a task, every equid involved in human labor or pursuit, exerting physical and mental effort, is strictly a working equid.

For millennia,^{1,2} humankind has relied on equids to succeed, by sensibly taking advantage of their biomechanical, biochemical and behavioral characteristics.

Biomechanics is the application of mechanical laws to living structures. By studying the forces that act on a biological object, as well as the effects that such forces produce, biomechanics can extend from the function of simple proteins to the motion of an organism as a whole. Biochemistry is, in turn, the chemistry of those living organisms, including their chemical constituents and vital processes. It focuses on the molecular nature and functioning of life, as well as on changes occurring in cells; relying on biology, chemistry, physics and immunology to understand the ways molecules interact to form cells, tissues, and complete organisms.

Behavior is the study of how animals move in their environment, how they interrelate socially, how they learn about the environment, and how they achieve a cognitive understanding of it.³ Involving the interaction of the animal with its physical environment, with other members of the same species, and with organisms of other species, behavior also denotes changes in response to stimuli; a fact particularly important in working equids, because their performance depends both on the ability of the handler to elicit a response, and on the extent at which conditions let the equid be mentally and physically able.

Current biological characteristics of equids are the result of more than 50 million years of evolution.⁴ From a welfare perspective, in the course of evolution,⁵ equids succeeded in coping with the changing environment by developing a phenotype that, besides favoring species preservation,^{6,7} must have guaranteed the quality of life, with the eventual genetic assimilation of those traits through the process of natural selection.⁸ In more recent times, just after domestication some millennia ago, human-driven management has influenced the phenotype of domestic equids in such a manner, that hundreds of breeds with diverse morphological and behavioral traits⁹ have thrived in different conditions, for the diverse purposes of work at human activities.

Whether for loading, riding, pulling or dragging, humans discovered how to harness the biology of equids to satisfy physical, cultural, social, economic, ecologic and emotional needs. However, science and technology, besides experience and traditional knowledge, show that welfare is essential for performance and, although in origin is simply how well the individual is faring through life;¹⁰ the concept of welfare has also evolved.¹¹

The "one-welfare" approach promotes that animal, human and environmental welfare is integrated. No matter the domain of practice, this more ecological philosophy must sensibly be promoted among the equine veterinary profession, especially because, from the perspective of anthrozoology, the biology of horses and the use of equipment to harness their natural traits for human development, meant that veterinary care was a core component for a mutually effective human–equid relationship around the world.¹²

With this motivating statement, the veterinary profession is legitimated to promote welfare and performance of working equids, just as it was the first time in history the word “veterinārius” was used and “la medicina veterinaria” was mentioned as the practice of medicine in the “bestia veterinaria”, namely beast of burden.¹³ As professional practice is conceived, working equids welfare must be promoted with a practical approach.

However, before outlining a practical approach to working equids welfare, a concept of practical is needed.

In a classic reference,¹⁴ “Science” is described as the art of “knowing what”, whilst “Technology” as “the art of knowing how” and “Theory” as “the art of knowing why”. As a practical art, “Technique” is “the art of doing”, founded on our knowledge of what, how and why. Therefore, by saying “practical” we mean actual experience, in the real world, but always based on evidence. Evidence that comes from science, but may also come from traditional knowledge, which plays an important role in all aspects of human life and livelihoods.¹⁵

Working equids play an essential role in the lives and livelihoods of millions of people around the world.¹⁶ Activities in which horses, donkeys, mules and hinnies are involved differ according to environmental, human and animal aspects.¹⁷ In consequence, issues affecting to, and depending on, equine welfare and performance, as well as resources to manage them, do also vary across regions.

Assessing animal welfare and proposing practices to promote it has become an essential competency in the veterinary profession.¹⁸ Evaluating the quality of life of an equid is requested to practitioners more often than before, not only for the good purposes of charity and education, but also for the own benefit of the equids and individuals, communities, and ecosystems reliant on their functioning as living beings or working animals.

There are, fortunately, strong indicators and a significant number of tools to assess equine welfare,^{19,20,21,22} some of them specific for working equids.^{23,24} Whichever the tool, it is advisable that the practitioner conceives welfare as the animal’s state as regards its attempts to cope with its environment,¹⁰ and, in the particular case of working equids, it is not only about succeeding to cope with the conditions at which they live, but also at those where they perform, because the degree at which their faculties contribute to achieve a purpose or result, may also determine their welfare.

Therefore, whilst approaching welfare, one has to begin by the animal in terms of its biomechanics, biochemistry and behavior, assessed through physical, physiological and behavioral parameters related to their demeanor, nutrition, soundness, movement and health, always considering the animal, human and environmental aspects that affect welfare and performance.

This practical approach enables not only to observe normal function and recognize alterations, but also to propose practices to manage conditions and faculties to cope, and to eventually guarantee that working equid welfare for performance is promoted.

1. Todd ET, Tonasso-Calvière L, Chauvey L et al. (2022) The genomic history and global expansion of domestic donkeys. *Science* 377 (6611): 1172 – 1180. DOI: 10.1126/science.abo3503
2. Librado P, Khan N, Fages A et al. (2021) The origins and spread of domestic horses from the Western Eurasian steppes. *Nature* 598, 634 – 640 DOI: 10.1038/s41586-021-04018-9
3. Breed MD, Moore J (2022) Of Cockroaches and Wolves: Framing Animal Behavior. In: Breed MD and Moore J (Eds.) *Animal Behavior* (Third Edition). Academic Press. 2022. Pp: 1-27. ISBN 9780128195581. DOI: 10.1016/B978-0-12-819558-1.00001-4
4. Librado P and Orlando L (2021) Genomics and the Evolutionary History of Equids. *Annual Review of Animal Biosciences* 9: 81–101. DOI: 10.1146/annurev-animal-061220-023118
5. Dawkins MS (1998). Evolution and Animal Welfare. *The Quarterly Review of Biology* 73(3): 305 – 328. <http://www.jstor.org/stable/3036918>
6. Janis CM and Bernor RL (2019) The evolution of equid monodactyly: A review including a new hypothesis. *Frontiers in Ecology and Evolution* 7: 119. DOI: 10.3389/fevo.2019.00119

7. Janis C (1976) The evolutionary strategy of the Equidae and the origins of rumen and cecal digestion. *Evolution* 30: 754 – 774. <https://www.jstor.org/stable/2407816>
8. Waddington CH (1953) Genetic assimilation of an acquired character. *Evolution* 7(2): 118 – 126. <https://www.jstor.org/stable/2405747>
9. Librado P, Fages A, Gaunitz C et al. (2016) The evolutionary origin and genetic makeup of domestic horses. *Genetics* 204: 423-434. DOI: 10.1534/genetics.116.194860
10. Broom D (1996) Animal welfare defined in terms of attempts to cope with the environment. *Acta Agriculturae Scandinavica Section A Animal Science Supplement* 27: 22 – 28.
11. Arndt SS, Goerlich VC and van der Staay FJ. (2022) A dynamic concept of animal welfare: The role of appetitive and adverse internal and external factors and the animal's ability to adapt to them. *Frontiers in Animal Science* 3: 908513. DOI: 10.3389/fanim.2022.908513
12. Taylor WTT, Bayarsaikhan J, Tuvshinjargal T et al. (2018) Origins of equine dentistry. *PNAS* 115 (29): E6707 – E6715. DOI:10.1073/pnas.1721189115/-/DCSupplemental
13. Bols PEJ and de Porte HFM (2016) The horse catalyzed birth of modern veterinary medicine in 18th-Century France. *Journal of Equine Veterinary Science* 41: 35 – 41. DOI: 10.1016/j.jevs.2016.04.003
14. Zimann J (1976) *The Force of Knowledge: The Scientific Dimension of Society*. Cambridge University Press. Great Britain. ISBN 10: 0521206499 / ISBN 13: 9780521206495
15. Ray S (2023) Weaving the links: Traditional knowledge into modern science. *Futures* 145: 103081. DOI: 10.1016/j.futures.2022.103081
16. Grace DC, Diall O, Saville K et al. (2022) The global contributions of working equids to sustainable agriculture and livelihoods in agenda 2030. *Ecohealth* 19(3): 342 – 353. DOI: 10.1007/s10393-022-01613-8.
17. Tadich TA (2020) Working equids: linking human and animal welfare. *Veterinary Record* 187(11): 442 – 444. DOI: 10.1136/vr.m4572
18. Matthew SM, Bok HGJ, Chaney KP et al. (2020) Collaborative development of a shared framework for competency-based veterinary education. *Journal of Veterinary Medical Education* 47(5): 578 – 593. DOI: 10.3138/jvme.2019-0082
19. Lesimple C (2020) Indicators of horse welfare: state-of-the-art. *Animals* 10: 294. DOI: 10.3390/ani10020294
20. AWIN (2015) AWIN welfare assessment protocol for donkeys. DOI: 10.13130/AWIN_DONKEYS_2015
21. AWIN (2015) AWIN welfare assessment protocol for horses. DOI: 10.13130/AWIN_HORSES_2015
22. Hausberger M, Lerch N, Guilbaud E et al. (2020) On-farm welfare assessment of horses: the risks of putting the cart before the horse. *Animals* 10: 371. DOI: 10.3390/ani10030371
23. Raw Z, Rodrigues JB, Rickards K et al. (2020) Equid assessment, research and scoping (EARS): The development and implementation of a new equid welfare assessment and monitoring tool. *Animals* 10: 297. DOI: 10.3390/ani10020297
24. Sommerville R, Brown AF and Upjohn M (2018) A standardized equine-based welfare assessment tool used for six years in low and middle income countries. *PLoS ONE* 13(2): e0192354 DOI: 10.1371/journal.pone.0192354

Mariano Hernández-Gil

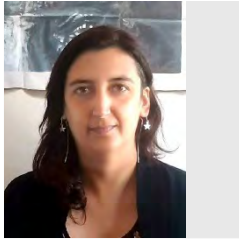
MVZ Cert. MC
Equine Welfare and Performance
National Autonomous University of Mexico

Enjoying equitation since childhood, Mariano qualified in Veterinary Medicine and Animal Science by the National Autonomous University of México (UNAM) in 2000, and two years later obtained a Master's Degree in Animal Nutrition by the Autonomous University of Yucatán.

Certified in Equine Practice by the Mexican Council of Veterinary Certification, his professional development has been committed to welfare where equids are essential; always promoting the good traditional knowledge, whilst introducing science and technology to facilitate effective human-equid relationships.

Practicing in diverse equine contexts and interplaying with stakeholders with distinct backgrounds, his main interests are in behavior, nutrition, soundness, locomotion and health, as well as in sustainable development and veterinary education.

Mariano is a full-time Equine Professor at UNAM. As an educator with expertise in work, production, leisure and sport equids, he balances agricultural and medical models of veterinary education, to promote competence for equine welfare, health and performance at every context.



WELFARE OF WORKING MULES

Tamara Tadich G

Programa Équidos and Programa de Bienestar Animal, Universidad Austral de Chile. Instituto de Ciencia Animal, Facultad de Ciencias Veterinarias, Universidad Austral de Chile.

Although mules (*E. asinus* x *E. caballus*) are essential for pack work and increase in resilience in mountainous areas, little research has been done on this species. Working mules, as other working equids, are confronted with different risks for their welfare, these include inadequate human-animal interactions, inappropriate working practices, problems in the correct design of harnessing systems and a lack of understanding of their behavior and biology which may lead to negative perceptions about this hybrid. During the last years we have tried to understand better some of these risk factor in order to develop welfare strategies.

Many people consider mules as more aggressive than horses and donkeys, reason why we studied the perceptions, attitudes, empathy and pain perception of soldiers about mules used by the Chilean Army. By using different instruments to assess these constructs we found that there was a wide range of ages and years of experience working with equids among soldiers, which may affect their perceptions. Significant positive correlations were found between human empathy, animal empathy and pain perception. Soldiers show a preference for working with mules over donkeys and horses, since they describe them as more intelligent and stronger, in particular when logistic work in mountain areas is required. Nevertheless, they were described as more aggressive than horses and donkeys. Donkeys were the least preferred species to work with by soldiers. Text mining analysis showed three clusters associated with the mules' needs according to soldiers' knowledge, these clusters represented nutritional, environmental and health needs. In the same line, relevant relations were found for the word "attention" with "load", "food", and "harness". When asked what mules signify for them, two clusters were found, associated with mules' working capacity and their role in the army. Relevant relations were found between the terms "mountain", "support", and "logistics", and also between "intelligent" and "noble".

Another intrinsic risk factor for working mules' welfare could be the selection of morphological attributes that are less suitable for work. Physical attributes are important features that can affect management, performance, and welfare. We have assessed 16 morphometric traits and six morphofunctional indexes of army mules in order to understand their aptitude for work but also to understand which type of mules soldiers prefer to work with. The studied mules were well-balanced, with more riding and saddle type aptitude than for load work. According to responses, the ideal pack mule should be docile, medium size, resistant and suitable for load work in mountainous terrain. Medium size mules, with a height to the withers of 140cm were preferred, probably because they are easier to handle and pack than large mules of around 160cm to the withers, making the work of soldiers easier.

Size and morphology could also influence load and work capacity, this is why we investigated the performance and recovery capacity of three different sizes of mules (small, medium and large) while carrying different loads (80, 105 and 130 kg) after a 2km and an 8km walk. Physiological indicators associated to heart rate, respiratory rate and rectal temperature were assessed. Only for the 130kg load, after a 2km walk, mules were not able to recover basal frequencies after 10 minutes ($P < 0.05$). In terms of blood indicators, only serum cortisol showed significant changes for all loads ($P < 0.05$), recovering basal concentrations after 2 hours finished the 2km walk. For the 8km walk only the 105kg load was assessed, the heart rate and respiratory rates showed significant increases, recovering basal frequency after 10 minutes past the end

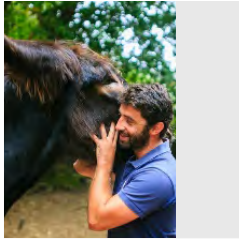
of the walk. In terms of blood indicators, only potassium, fibrinogen, and cortisol showed significant differences between sampling times ($P < 0.05$). Potassium decreased after 2h past work, fibrinogen showed an increase 5 days after work, and cortisol showed a significant increase at arrival, but then returned to basal concentrations 2 hours later. We did not find an effect of mule size on their physiological response to work. Another welfare concern when mules perform pack work is that they can develop skin wounds and lesions on harness related areas of the body, but also muscular and bone damage that are not always visible during clinical examination. In particular, this can happen with a harnessing system that does not fit appropriately. We have used thermographic imaging and pressure sensors as non-invasive diagnostic alternatives to understand the effect of different loads on the back of mules. A crossover design was used with twelve mules carrying three different loads (80, 105, and 130 kg) for two kilometers. Four pressure sensors were placed in the harnessing system to assess the pressure (N) of the loads. Thermographic images of the back were taken daily before and up to five days after the harnessing work. We found that heavier loads (105 and 130 kg) generated a significant increase of temperature ($P < 0.05$) in all the analysed areas of the mules' back, with no significant differences between anatomical areas. The pressure sensors did not reveal significant differences between load treatments or between anatomical areas, also there was no evidence of a correlation between pressure and temperature.

There are still grey areas that need to be investigated, in particular in terms of mules' behavior and biology. Also we need to consider that the variability of mules features between countries is huge, since many characteristics will depend on the selection of the jack and mares breed, so it is difficult to generalize findings from one group of mules under a particular geographic and cultural system to another.

References

1. 2023. Lagos J, González I, Tadich T. Use of thermography and pressure sensors as indicators of the effect of load on pack mules. *Austral Journal of Veterinary Sciences* 55, 69-75 <https://doi.org/10.4067/S0719-81322023000100069> Special Issue Working Equids.
2. 2022. Lagos J, Rojas M, Tadich T. Morphological characteristics, preferences, and perceptions of the ideal working mule. *Journal of Equine Veterinary Sciences*. 108, 103821
3. 2021. Lagos J, Rojas M, Rodrigues JB, Tadich T. Perceptions and attitudes towards mules in a group of soldiers. *Animals* 11, 1009. <https://doi.org/10.3390/ani11041009>
4. 2019. Lagos J, Tadich T*. "Hematological and biochemical reference intervals for mules in Chile". *Frontiers in Veterinary Science*. DOI: 10.3389/fvets.2019.00400

Tamara Tadich is a veterinarian with a Master of Science in Equine Sciences from the University of Edinburgh and a PhD in Veterinary Sciences from Universidad Austral de Chile. She is currently an Associate Professor at the Animal Science Institute of the Universidad Austral de Chile and Director of the Animal Welfare Programme, which is part of the World Organisation for Animal Health Collaborating Centre for Animal Welfare and Sustainable Livestock Systems. Her research focuses in working equids welfare.



Innovative approaches for better health and welfare of working donkeys.

João B. Rodrigues, DVM, PhD. The Donkey Sanctuary

The most recent official data points to there being a total of 60,842,839 donkeys and hybrids in the world (53,033,466 donkeys and 7,809,373 hybrids), with 96% and 93% of these equids being present in Low- and Middle-Income countries, respectively¹.

These figures illustrate the importance of equids as working animals for millions of people worldwide, playing a key role as clean, accessible, and sustainable co-workers across numerous contexts, contributing to resilience, productivity, economic growth, and diversification^{2,3}.

The fundamental work carried out by these animals should always be framed within respect for their physical and mental limits, their dignity, the presence of adequate working conditions (including the use of appropriate harness and implements) and ensuring that their health and welfare are seen as priorities.

Unfortunately, these assumptions are still far from reality, due to socio-economic and cultural aspects affecting many owners and users of working equids worldwide. Owners and users demonstrate limited knowledge regarding welfare indicators, with a direct impact on the health and welfare of their animals. Such reality is exacerbated if we add the lack of qualified professionals who can provide health services to working equids and should have an active role in the education and awareness of owners. Selected data pointed that 90% of the world population of equids only receive 10% of the veterinary care⁴, with working equids clearly suffering the most from this discrepancy.

Another aspect to consider is the lack of curricular content and subjects dedicated to donkeys and hybrids, in hundreds of universities around the world. In countries with some of the largest populations of working donkeys and hybrids, a lack of formal education for future professionals represents a real obstacle to ensuring that more working equids receive appropriate care.

As part of the new strategy, The Donkey Sanctuary (TDS) outlined some truly ambitious objectives for the next 5 years, both in terms of the number of people, and the animals that they intend to reach. Education is a crucial part in this process, through which values and knowledge acquired by TDS can be shared and applied with those who will benefit the most: donkeys and hybrids. For that, TDS developed The Donkey Academy, an innovative online education and knowledge sharing platform.

The talk will focus on the Donkey Academy University Partnerships and Alumni Programme, a joint programme between TDS and Equitarian Initiative launched in 2023 for Latin America, is in its early stage, but has the aim of creating strategic partnerships with universities from all over the world. The project includes the development of online courses directly focused on professionals / future professionals, in areas such as veterinary medicine, animal welfare, and animal husbandry, and will provide trainees with both theoretical and practical knowledge in different areas directly related to the health and welfare of working equids, so that can be incorporated into their daily / future professional work.

The Programme includes other educational, scientific, and technical actions and activities that create and disseminate knowledge about working equids, while raising their profile. Innovative pedagogical approaches, moving from didactic to participatory and problem-based learning, in line with modern academic curricula will be applied.

As main aims, this project intends to engage in university-level educational activities focused on promoting health and welfare of working equids; promote interest among the academic community about donkeys

and mules, to raise their status; provide curricular support and fill the existing curricular gaps; and raise awareness about the unique nature and specific needs of working equids, mainly donkeys and hybrids. As a final aim, the Programme intends to promote a vibrant online Alumni community who regularly meet to share knowledge and problem solve issues from different cultural contexts.

Ensuring that future generations of professionals understand the value and importance of working equids in the world, at the most varied levels, and that they apply the acquired knowledge in favour of these animals, is certainly an effective way of contributing to their health and welfare and ensure that working equids live and work in the dignified conditions they so deserve.

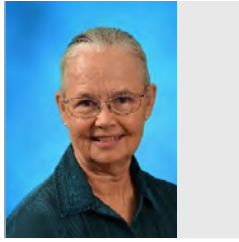
References:

1. FAOSTAT. FAO Statistical Yearbook. Food and Agricultural Organisation of the United Nations. Available online: <http://www.fao.org/faostat/en/#home> (accessed on 15 August 2023).
2. HLPE (2016). Sustainable agricultural development for food security and nutrition: what roles for livestock? A report by the High-Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome. Available from: <https://www.fao.org/3/i5795e/i5795e.pdf>
3. EuroGroup For Animals, World Horse Welfare, The Donkey Sanctuary (2022). Working Equids in the European Union. Available from: <https://www.eurogroupforanimals.org/files/eurogroupforanimals/2022-12/2022-12-15-Working%20equids%20in%20the%20European%20Union-Report.pdf>
4. Merriam J., Hernandez-Gil M., Anzuino J. (2010). Introduction to Veracruz Equitarian workshop. Veracruz, Mexico.
5. The Donkey Sanctuary (2022). The Donkey Academy. Available from: <https://thedonkeysanctuary.eu-west.catalog.canvaslms.com>

João B. Rodrigues

Senior Lead – Welfare Assessment. The Donkey Sanctuary.

João B. Rodrigues is a Portuguese Veterinarian, qualified at the University of Trás-os-Montes and Alto Douro (Portugal), in 2007. In 2011 was classified as an Expert in Veterinary Dentistry and Maxillofacial Surgery by the Complutense University of Madrid (Spain), and in 2013 obtained a Ph.D. focusing on research in the field of donkey dentistry. He was appointed as Professor of Medicine and Surgery of Equids in Portugal in 2013, and joined The Donkey Sanctuary in 2016. João has extensive donkey medical and welfare experience globally, with a special interest in working donkeys. He is a regular lecturer, tutor, and practical assessor in different topics related with working equids worldwide, and has published numerous articles and contributions to books. He is the chair of the Portuguese Association of Animal Traction (APTRAN) and the FECTU - European Draught Horse Federation.



Behavior as a Tool to Improve the Welfare of Horses, Mules and Donkeys

Julia H. Wilson, DVM, Diplomate, ACVIM; Equitarian Initiative; Stillwater, MN, USA

The behavior of horses, donkeys and mules and the behavior of the humans they interact with are inextricably linked and exert a strong influence on the welfare of both groups. Why are most behavioral issues that impact equid welfare caused by people? There are many reasons, some of which can be addressed with education and hands-on training. In some impoverished developing countries, equids may not be perceived as sentient animals and therefore treating them as a disposable tool may be acceptable. The region may not have a culture of horsemanship so knowledge of horse handling and health care may be minimal. Traditional training techniques may be harsh, creating an interaction where the animal learns through negative reinforcement. Culturally acceptable cruelty, particularly in men, is ingrained in many communities and hard to change.

Using patience and positive reinforcement, an equid's behavior is easier to improve than the behavior of their humans. Veterinarians must recognize that behavioral modification to allow examination and treatment can seldom be achieved quickly. Most misbehavior by horses, donkeys and mules during their human interactions is learned or reactionary. Avoidance or defensive behaviors may be triggered by pain, often unrecognized by the human. Addressing the source of the pain, if present, is necessary to begin to change that behavior. Control of the working environment to minimize stress is also key for training. Absent distraction, the animal can focus on its lesson which may be successful in a shorter period. Differences in training approaches between horses, donkeys and mules should always be considered.

Improving human behavior to improve equid welfare is more challenging. Culturally sensitive approaches seem to be the most effective. Creation of an interest or incentive for behavioral change is key. Participatory learning within a community has been most successful. Demonstration of a calmer, gentler way of handling the animal is a great start and is ideally provided by a person who is similar to the owner (gender, language, background, etc). Interactive, informal small learning groups with short lessons over several days give the learners time to practice the techniques at home before the next lesson as well as finish their normal day's work. Role playing can be an effective exercise to emphasize the importance of clear communication with the equid: one owner plays the role of the "equid" who can only respond to cues from the owner. The "owner" then must learn to communicate speed and direction to the "equid" using reins to a dowel in the "equid's" mouth, voice, and a stick. Education on foot trimming/shoeing and common sources of pain such as harness and bits can also be imparted. One or two of the owners may then become instructors to others in the community using the same techniques.

Children and women may be the primary caretakers of a working equid, or at least look after it when it is not working. Children are often the most receptive to gentler training techniques and basic health care lessons. Utilizing the same principles, using role playing, and interjecting humor has been successful in many communities. Women's groups within a community can also be engaged and are frequently more receptive to new ideas and techniques.

Emerging research from social scientists as well as animal professionals will continue to generate ideas and techniques to improve human behavior and demonstrate the effectiveness of positive reinforcement in equid – human interactions.

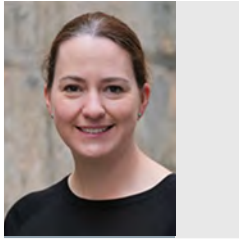
Bibliography

Madariaga-Najera M, Torres-Sevilla MA. Perception and relationship changes of owners towards their mules to improve animal-human welfare in Tlaxcala, Mexico. In: 7th International Colloquium on Working Equids. Royal Holloway, University of London; 2014. p. 120–1.

C.R. Heleski, A. K. McLean, and J. C. Swanson. 2010. Practical Methods for Improving the Welfare of Horses, Donkeys, and other Working Draught Animals in Developing Areas, Pp 252-73. In: Improving Animal Welfare a Practical Approach, ed. Temple Grandin. CAB International.

Dr. Julia Wilson graduated from Cornell University in 1978. She pursued an internship in large animal medicine at the Ontario Veterinary College followed by a residency at the University of Florida. She is a Diplomate of the American College of Veterinary Internal Medicine. She served the majority of her career as a faculty member, first at the University of Florida and then the University of Minnesota. She now works as the Executive Director of the Minnesota Board of Veterinary Medicine. As an academic, beyond the joy of teaching and clinical work, her research focused on topics of neonatology, gastroenterology and infectious diseases. Dr. Wilson has served on the Board of Directors of the American Association of Equine Practitioners as well as on many AAEP Committees.

Dr. Wilson's international childhood, opportunities to lecture in other countries and experience on the Board of Directors of Heifer International led her to partner with Dr. Jay Merriam to create Equitarian Initiative, a U.S. non-profit organization that works to improve the health and welfare of working horses, donkeys and mules and the families that depend on them. This organization currently has programs in nine countries. Many include collaboration with local veterinary colleges to enhance the equine curriculum through teaching and provision of veterinary care in communities in need. She is currently on the Board of Directors of Brooke USA Foundation, another nonprofit organization that supports working equids. She is married to Tracy Turner, DVM, MS, DACVS, DACVSMR who shares her passion for international service.



Working Equid Biomechanics

Rebecca S. V. Parkes

BSc BVetMed PhD Cert AVP PG Cert (Vet Ed) FHEA MRCVS

Associate Professor, Large Animal Medicine and Surgery Department, School of Veterinary Medicine, St George's University, Grenada, West Indies

Working equids play a key role in supporting the livelihoods of many people in low and middle income countries (LMICs). They are typically used for work involving load carrying or draft power for transporting either people or goods, and their welfare is inextricably linked to that of their owners (Tadich, 2020). Historically, their economic importance has been overlooked as it is less easy to quantify than the contribution of production animals, but this is beginning to change. The loads that they carry and pull are usually far more than what is expected of competition or leisure horses, and often they will transport these loads for a prolonged period of time, and under challenging environmental conditions. For example, while there is regional variation, a quarter of donkeys in Pakistan have been reported to carry loads equal to 90% or more of their own bodyweight, with some donkeys estimated by their owners to be carrying more than 150% of their bodyweight (Bukhari et al., 2022). This is far from unusual, and has been reported in multiple locations.

Given the obvious welfare issues faced by working equids, such as poor body condition, musculoskeletal problems, parasitism, behavioral issues and poor access to veterinary care, biomechanics may seem an odd topic to cover. However, biomechanics are simply how the animal (and its load) moves, and this has a key impact on musculoskeletal conditions, which are a leading cause of poor welfare in working equids. An understanding of how this works is helpful when considering problems and developing interventions, although most work on biomechanics has been conducted on sports horses and Thoroughbred racehorses, and may not be directly transferable to donkeys or mules.

In terms of locomotor abnormalities when load carrying, increasing loads can lead to a reduction in gait symmetry and gait stability, as well as alterations to stance time (the time each hoof is in contact with the ground) and the horse's head and neck position (Bukhari et al., 2021). These changes may occur at a relatively low load, and could provide a useful tool for professionals to assess load appropriateness in conjunction with behavioral and physiological indicators. The biomechanics of load pulling have been less well-studied than load carrying. The impact of pulling a load is different to carrying one, and depends on the type of vehicle or load (e.g., two or four wheeled cart, sled, log, etc.). Draught force can be defined as the force required to pull a load in the same direction of travel as the animal, and this and the harness have a large impact on the forces experienced by the animal (Bukhari and Parkes, 2023). For example, when donkeys are used in logging, a greater force is required to pull a sled compared to a wheeled vehicle, and more force still is required to pull a log alone (Rodrigues et al., 2023). In addition, full collars, shaped or adjusted to take into account the different shape of a donkey's neck in comparison to a horse's, spread force more effectively and are likely to result in improved welfare (Garrett et al., 2021). This knowledge, alongside practical considerations such as availability and cost of materials, may impact on an owner's choice of draught equipment.

When considering interventions for working equids, it is essential to keep in mind the function of the animal, the environment in which they work, and what resources are available locally. For example, it is more helpful to an owner to help them redesign their donkey's collar using locally available material, so that they can undertake future modifications and repair themselves, than it is to give them an imported item of equipment. Novel approaches to problems (e.g., looking at biomechanics research in horses used for sports) can help in answering some questions and provide solutions. Future work should focus on using

an understanding of working equid biomechanics to identify areas for practical improvements, help those working in the field, and inform policy.

References

1. Bukhari, S. S. U. H., McElligott, A. G., & Parkes, R. S. V. (2021) Quantifying the Impact of Mounted Load Carrying on Equids : A Review. *Animals*, 11, 1333. <https://doi.org/10.3390/ani11051333>
2. Bukhari, S. S. U. H., Rosanowski, S. M., McElligott, A. G., & Parkes, R. S. V. (2022) Welfare concerns for mounted load carrying by working donkeys in Pakistan. *Frontiers in Veterinary Science*, 9, 886020. <https://doi.org/10.1101/2022.03.07.483371>
3. Bukhari, S. S. U. H., & Parkes, R. S. V. (2023) Assessing the impact of draught load pulling on welfare in equids. *Frontiers in Veterinary Science*, 10. <https://doi.org/10.3389/fvets.2023.1214015>
4. Garrett, C., Norris, S. L., Rodrigues, J. B., Queijo, L., Cooke, F., & Judge, A. (2021) Collar pressure mapping : An evaluation of seven collar types used on working donkeys in Europe. *Veterinary Record*, e772(June), 1–10. <https://doi.org/10.1002/vetr.772>
5. Rodrigues, J. B., Garrett, C., Norris, S. L., Albuquerque, F., Queijo, L., Coelho, J. P., Cooke, F., & Judge, A. (2023) May the force be with you: an investigation into logging methods using donkeys. *Austral J Vet Sci* 55(1), 23-33. <http://dx.doi.org/10.4067/S0719-81322023000100023>
6. Tadich, T. A. (2020) Working equids : linking human and animal welfare. *Veterinary Record*, 187(11), 442–444. <https://doi.org/10.1136/vr.m4572>

Dr Rebecca Parkes is Associate Professor in the Department of Large Animal Medicine and Surgery at St George's University School of Veterinary Medicine, Grenada.

Rebecca graduated from the Royal Veterinary College and undertook an internship in equine orthopaedics before spending a period of time volunteering for a working equid charity in Luxor, Egypt. She then returned to the RVC for her PhD in equine locomotor biomechanics before moving to Hong Kong to work for the Hong Kong Jockey Club as a clinician. After this, she took on an Assistant Professor position at the Jockey Club College of Veterinary Medicine and Life Sciences at City University of Hong Kong, before her most recent move to Grenada.

Rebecca's research is predominantly focused on musculoskeletal conditions and she has particular interests in working equids and veterinary education. She is currently supervising a PhD student from Pakistan on the project 'How Much Can a Donkey Carry?', investigating biomechanical, physiological and behavioural markers in load carrying in working donkeys in Pakistan. She is interested in community engagement and developing scientifically sound, practical solutions to issues facing working equids.