



Evidence-based farriery – does it exist?

There has been a quantum advance in evidence-based veterinary medicine, in terms of both diagnosis and treatment of equine-related problems. Yet, farriery is still based mainly on historical anecdotes rather than robust peer-reviewed research. A simple PubMed search using the keywords “farriery”, “podiatry”, “shoeing” and “trimming” in combination with horse/equine in the title and/or keyword list renders less than 200 papers. In comparison, the search terms “colic” and “horse” or “fracture” and “horse” render about 1500 and “diagnostic imaging” and “horse/equine” over 6000.

So why is it that it is generally accepted that foot care plays a key role in maintaining and improving horse soundness and performance, yet there continues to be a lack of scientific evidence in this area? This editorial will explore what farriery research is, propose reasons why there is limited farriery research and discuss what the future may hold for farriery research.

Progress in evidence-based farriery?

Farriery-related research can be broadly categorised into basic research investigating the form and function of the equine hoof, and interventional studies looking into the effect of farriery on locomotor biomechanics and as a therapeutic measure in the treatment of foot problems. In the latter case, farriery intervention is often not the main topic of the study but often mentioned as part of the protocol.

Laminitis has dominated foot-related research in terms of numbers of publications. Recent years have seen huge advances in uncovering the complex pathogenesis of this common problem [1]. This has, in turn, led to developments in the medical and nutritional management of laminitic cases. Scientific evidence for farriery management of laminitic horses has lagged somewhat behind. Over the years, there has been a trickle of publications and a study investigating the use of mouldable thermoplastic shoes was performed in normal and obese Shetland ponies to determine if such an intervention would benefit laminitic ponies [2]. Since laminitis is such a prevalent and detrimental disease, and farriery is an integral part to its management, it would seem prudent to collect more scientific evidence to base this on.

It is not only in the treatment of laminitis that farriery research is playing catch up, there is also lack of scientific information in other areas. The 1990s and the 2000s were a golden period for research into the effect of shoeing and trimming on distal limb kinetics and kinematics. The broad aims of such studies were to inform management protocols for palmar heel pain (‘navicular syndrome’). Such investigations used force plates, pressure mats, optical motion capture and strain gauges [3]. Egg-bar shoes were well researched as a means to manage ‘navicular syndrome’ during this time [3]. Since then, however, there have been considerable advances in diagnostic imaging techniques used to diagnose palmar heel pain, and this has enabled veterinarians to differentiate between different causes of this syndrome. However, this advancement in evidence-based diagnosis has not yet been paralleled in farriery-based treatment, where still today there are many postulated beneficial farriery protocols but limited evidence to substantiate them. Furthermore, there has been an increase in the variety of hoof preparations available to farriers. It is possible that certain preparations and protocols, for example the use of sole packing materials, may be highly beneficial to a horse suffering from a particular cause of palmar heel pain, while another horse with a different pathology could be made significantly worse. Further research in this area would be of great benefit to farriery and veterinary decision-making.

Recent farriery biomechanics research has focused on the interaction between the hoof and the ground surface on the basis that this interaction is contributing to load distribution, shock absorption, injury risk and performance [4]. Often, it is the surface that has the greatest influence on the foot–surface interaction, which is complicated even more by the fact

that surface properties are not only determined by composition and construction but are also affected by weather conditions [5] and preparation. In studies of foot–surface interaction, placement of horses’ feet at first contact with the ground surface has received research attention recently. In adult horses, foot placement is highly variable and dorsal and palmar hoof angles are significantly associated with increased lateral toe landing [6]. This is in direct contrast to conventional wisdom that suggests that farriery should be aimed to achieve flat landing. A study on the development of foot placement preferences in foals under 24 weeks of age published in this issue of *Equine Veterinary Journal* shows landing and loading preference gradually shifts laterally and towards the heels [7]. Understanding the normal foot biomechanics of the horse is essential groundwork for determining when foot biomechanics is suboptimal.

The understanding of ‘what is normal’ is mainly based on anecdotal evidence, often perpetuated by textbooks without scientific evidence. It is interesting to see that in an epidemiological study looking at the management techniques used by the horse-owning population over half of the horses were shod with ‘traditional shoes’, an ambiguous term and a finding that the authors acknowledge needs further investigation [8].

Why is there limited farriery research?

We propose that there are three main factors inhibiting farriery research: 1) technical challenges inherent to farriery research; 2) lack of required combination of expertise and skill sets; and 3) lack of funding.

Interventional studies where one farriery method is compared against another involve the repeat application and removal of shoes that may compromise hoof wall integrity and also require the recruitment of a suitable number of horses for a robust estimation of small effects. This is especially challenging if a certain pathological condition is investigated. Longitudinal farriery projects are complicated as hoof quality, growth and distortion are influenced by many external factors, including horse management, time of the year, weather, etc. Research requires adequate resourcing and long-term, longitudinal studies are especially expensive.

Technical challenges associated with farriery research require the combination of engineering, veterinary and farriery knowledge and skills. Farriery research often involves the quantification of rather small changes in kinetics, kinematics or tissue deformation, thus presenting a technical challenge. Continuing advances in computing power and sensor technology aid in the development of not only more precise and accurate methods but also require a fresh validation of techniques [9]. The engineering and computer science skills associated with this type of methods are often beyond most veterinarians and farriers, and indeed most farriery-related research involves authors with an engineering and/or computer science background. Engineers willing to forego industry salaries in exchange for equine research are a rare commodity. Forming collaborations between all three professional groups is often logistically and financially challenging, and hence, there is only a very small number of research groups worldwide that are able to sustain this. Obtaining funding for farriery-related projects can be challenging. An additional reason for this may be that many foot-related problems while associated with a high morbidity have a low mortality, thus making it less compelling for funding bodies compared with other problems.

What does the future hold for evidence-based farriery?

Both farriers and veterinarians look after horses’ feet: the first group as an integral part of their routine management, and the other group are often only involved after things have gone wrong. As many lame horses never return to their previous level of performance, it seems logical to put more

emphasis on routine foot care, optimising load distribution within the individual horse's foot and promoting shock absorption with the ultimate aim of minimising the risk of injury in a preventative framework. To be impactful, scientific research must address problems that are relevant in practice and translate the findings so that they are accessible to the people 'on the shop floor', it therefore makes sense that both farriers and veterinarians contribute intellectually as well as technically to farriery- and foot-related research. Unfortunately to date, the number of farriers that have authored scientific papers is rather limited. This may reflect a lack of appreciation by the veterinary-led research teams for the potential input of farriers. In the UK (and other countries), farriery apprenticeship training results in highly skilled farriers with excellent topic-related knowledge and skills. However, farriery education in the UK (and elsewhere) does not include any research training, and historically, there have been few opportunities for farriers to develop the research skills needed to contribute to evidence-based farriery. One also has to bear in mind that farriers have their own journals they read and publish in. None of the farrier journals are currently peer-reviewed and equally not many farriers gain access to the peer-reviewed equine journals.

Over the last few years, there has been a gradual shift in the farriery profession to recognise the importance of scientific findings which is reflected in changes to the requirements postulated by the governing bodies nationally and internationally and the number of farriers undertaking higher education degrees. In the UK, the Worshipful Company of Farriers (WCF) has recognised the importance of science by including a thesis in the requirements of their Fellowship, the WCF's highest professional qualification. While there have been ample opportunities for farriers to attend courses to improve their shoe making skills, until recently farriers lacked the opportunity to acquire the support and skills needed to carry out robust research.

Opportunities for farriers to engage with research are thankfully now increasing. Higher education institutions have recognised the demand for research experience in the farriery profession and have started to include this in their teaching portfolio. Myerscough College, an associate college of the University of Central Lancashire (UCLan), offers a BSc course that includes training in research skills. The Royal Veterinary College offers a higher education degree in equine locomotor research tailored to farriers. This course is aimed at farriers with experience in advanced farriery who would like to gain the necessary skill set to produce original research with the ultimate goal of increasing the scientific evidence base behind farriery.

Summary

Farriery is an integral part of managing both the sound and lame horse. An article published in this issue of *Equine Veterinary Journal*, highlights that horse-owners engage well with farriery care for their horses and expect their farriers to be practising evidence-based farriery [10]. In order to increase the scientific evidence underpinning farriery, veterinarians, farriers

and engineers must seize opportunities to work together and engage with research institutions. Differences in training and professional experiences will lead to farriers, veterinarians and scientists to approach problems from different angles and the integration of the different expertise of these groups through farriery research is essential not only for producing practice relevant research but also for dissemination to the people in practice to the benefit of the horse.

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