Where you keep your horse can influence the risk of tapeworm infections, according to research from Poland.

The study, by Krzysztof Tomczuk and others, of the University of Life Sciences in Lublin, investigated factors affecting tapeworm (Anoplocephala perfoliata) infection in south-eastern Poland.

The researchers collected faecal samples from nearly 1000 horses for the study which ran from 2012 to 2014. Samples came from various farms in south-eastern Poland, between the months of October and December. (Previous work by the same research team had shown that late autumn/early winter is the best time of year for detecting tapeworm infections in faecal samples.)

They found that the risk of infection increased with the age of the horse. The highest prevalence was noted in the older age group (10–20 years of age).

Management and pasture type significantly influenced the level of tapeworm infection.

Horse kept on stud farms showed three times higher A. perfoliata prevalence compared to those kept in individual stables. Horses housed on shared pastures were four times more likely to be infected than those grazing individual paddocks.

Mares had over four times the level of infection of stallions—perhaps because stallions tend to be housed separately.

The moisture level of the pasture also played an important role. Horses kept on boggy pastures had significantly higher levels of infection than did those kept on dry pastures.

The tapeworm’s larval stage (“cysticercoid”) lives in mites (Oribatidae) that inhabit the pasture. In dry conditions these mites tend to stay close to the ground. However, in a moist environment they thrive, becoming more numerous and spreading further up the grass, increasing the risk that horses will ingest them while grazing.

The researchers concluded that the horses at the highest risk of tapeworm infection were mares over 10 years of age, kept in herds and grazing on a shared, boggy pasture. They recommend that these animals should be monitored regularly for tapeworm infection and subjected to anthelmintic treatment as necessary.

For more details, see:

Factors affecting prevalence and abundance of A. perfoliata infections in horses from south-eastern Poland.
A study led by Dr Sue Dyson at the Animal Health Trust in Newmarket has been developing a way to use behaviour signs to identify musculoskeletal pain in horses. Horses may show lameness when ridden even though they appear sound when trotted in hand. Indeed, many gait abnormalities go unnoticed by the horse’s rider.

Previous work at the Animal Health Trust found that, of 506 horses in normal work and thought by their riders to be sound, 47% were overtly lame or displaying pain-related gait abnormalities, such as a stiff and stilted canter.

In this study, Dyson and her colleagues aimed to develop a “whole horse ethogram” by which owners, trainers and equine professionals can recognise pain in their horses when they are ridden by assessment of facial expression and behaviour. The project was made possible by financial support from World Horse Welfare and the Saddle Research Trust.

The study evolved from Dyson’s extensive clinical work, recognising that too often poor performance has been labelled as ‘naughty’ behaviour or training problems, rather than pain. As a result, cases are referred to her too late when injuries have become chronic, so problems are well developed and the opportunity for recovery is compromised.

Starting with over 100 behavioural markers (such as ears held back, spontaneous change of gait, resisting…), the research team eliminated those that were difficult to score consistently and those that were not helpful in identifying pain, and combined some that were similar, until they were left with 24.

Initially, over 100 behavioural markers (such as ears held back, spontaneous change of gait, resisting…) were considered. Video recordings of 13 non-lame horses and 24 lame horses were assessed by a trained specialist.

The researchers modified the ethogram in response to their findings, removing some markers that were difficult to score consistently, or did not help to identify pain. They found a strong correlation between 20 behavioural markers and the presence of lameness.

Eventually the ethogram contained 24 behavioural markers.

Writing in the Journal of Veterinary Behavior: Clinical Applications and Research, the researchers report that “the maximum individual occurrence score for lame horses was 14 (out of 24 possible markers), with a median and mean score of 9 (±2 standard deviation) compared with a maximum score of 6 for non-lame horses, with a median and mean score of 2 (±1.4).”

They note that the following behaviours occurred significantly more in lame horses: ears back, mouth opening, tongue out, change in eye posture and expression, going above the bit, head tossing, tilting the head, unwillingness to go, crookedness, hurrying, changing gait spontaneously, poor quality canter, resisting, and stumbling and toe dragging.

They suggest that recognition of these features as potential indicators of musculoskeletal pain may enable earlier recognition of lameness and avoidance of punishment-based training.

For more details, see:

Development of an ethogram for a pain scoring system in ridden horses and its application to determine the presence of musculoskeletal pain
Sue Dyson, Jeannine Berger, Andrea D. Ellis, Jessica Mullard

Results from this study will be presented at the Saddle Research Trust International Conference in 2018. (See below..)

Saddle Research Trust International Conference 2018

The Saddle Research Trust 3rd International Conference will be held on Saturday 8th December 2018.

It promises to be the biggest and best yet. Building on the ground-breaking research and progress achieved since the inaugural conference in 2012, the latest research will be presented by leading experts in their fields. Keynote speakers include Dr Sue Dyson and Professor Hilary Clayton.

The conference will be hosted at an exciting new venue, the Nottingham University De Vere Centre, which has first class facilities, ample free parking and is centrally located for convenient road and rail links. For those wishing to make a weekend of it, the De Vere Orchard Hotel is situated on site.

For more details, see...
http://saddleresearchtrust.com/
Developing a reference ethogram for equitation science

Ask a veterinarian, a judge and a farrier to describe a particular horse and you might get three very different answers. Show them a set of behaviours and ask them to name and characterise them and you might well believe they were observing different horses altogether. This might be amusing as a party game, but when it comes to discussing behaviour at a scientific level or to comparing one behaviour study with another, it presents a unique set of problems.

Marc Pierard, from the University of Leuven, Belgium with his colleagues Prof. Paul McGreevy and Prof. Rony Geers discussed the development of a descriptive reference ethogram for equitation science in a paper presented at ISES 2017 Down Under Conference in Wagga Wagga, New South Wales, Australia.

An ethogram is a quantitative description of an animal’s normal behaviour - a catalogue of behavioral patterns.

Whilst it is common practice for researchers to develop their own ethograms for use in their individual studies, the ultimate goal of a species ethogram is to produce a comprehensive list of clearly defined and named behaviours and, ultimately, what they mean. Admitting that we have a long way to go to reach that lofty goal, a simpler descriptive ethogram for use in equitation science would be a useful start.

The availability and adoption of such an ethogram would increase the validity, repeatability and comparability of equitation science behaviour studies allowing for more efficient statistical analysis. Whilst it may sound very basic research, the work is only now being done.

For this project, the researchers conducted a feasibility study using a panel of 13 equitation science researchers plus 10 high level practitioners. The panellists received basic training on the application of a reference ethogram and were asked to score a series of short video clips displaying a range of behaviours. The results showed a high level of agreement between academics and practitioners, indicating a high degree of accuracy and reliability.

These preliminary findings suggest that agreement on descriptive definitions of behaviours is certainly possible.

According to Marc Pierard, agreement on the description is the first step in the process: “We should not ignore the importance of description based research. We should avoid what Konrad Lorenz called ‘the fashionable fallacy of dispensing with description’. We all should watch and observe our horses. There is great power in the practice of observation and in what we can learn from this simple act.

“The work of developing a descriptive reference ethogram may be an enormous task, yet we could never consider the work to be finished; it should allow for flexibility, it should invite constant and rigorous criticism and welcome attempts at improvement.”

“Once the description and definition is commonly agreed upon we can move on to the business of explaining causes and functions, but first we need to get back to basics and build a solid foundation.”

Equine Science Update e-news is now available.
Receive monthly news by e-mail
See: www.equinescienceupdate.com for details.
Horses prefer to approach submissive people

Horses can tell the difference between dominant and submissive body postures in humans, even when the humans are not familiar to them, according to a new study.

The findings enhance our understanding of how animals can communicate using body posture across the species barrier, and are specifically helpful for informing horse handlers and trainers about the ways horses perceive human body language.

Psychology researchers worked with 30 domestic horses to see whether they were more likely to approach a person displaying a dominant body posture (involving the person standing straight, with arms and legs apart and chest expanded), or a submissive posture (slouching, keeping arms and legs close to the body, relaxed knees).

They found that even though the horses had been given food rewards previously by each person when in a neutral body posture, they were significantly more likely to approach the individual displaying a submissive rather than a dominant posture in follow-up trials.

Co-lead author of the study, psychology doctoral student Amy Smith, said: "Horses are often thought to be good at reading human body language based on anecdotal evidence such as the 'Clever Hans effect'. However, little research has tested this empirically. These results raise interesting questions about the flexibility of cross-species communication."

Dr Leanne Proops, co-author (University of Portsmouth), said: "Evolutionarily speaking, animals -- including humans -- tend to use larger postures to indicate dominance, or threat, and smaller postures to indicate submissiveness. Horses may therefore have an instinctual understanding of larger vs. smaller postures."

Last year Amy, who is part of the Mammal Vocal Communication and Cognition Research Group in the School of Psychology at the University of Sussex, co-led a study that found horses were able to distinguish between angry and happy human facial expressions.

Clara Wilson, who co-authored the paper while an undergraduate at the University of Sussex, said: "We were interested in dominant and submissive postures with horses specifically because, although many trainers use posture as a training cue, little research has investigated whether horses would be sensitive to these cues without any specific training."

"Results like these encourage us to be more conscious of the signals we exhibit when interacting with horses and other animals to facilitate a smooth animal-human relationship."

The researchers recruited horses at three equestrian centres in Suffolk and East Sussex. All the handlers were women, dressed in similar clothing and of similar size. A dark neck warmer covered their faces to eye level to minimise facial expression cues.

The horses, who had previously been fed by two people, were given a free choice to approach either the person displaying the dominant or the submissive body posture. Over the course of four trials, they found that horses showed a preference for approaching the person displaying the submissive body posture, rather than showing a preference for an individual handler or a particular side.

This latest study, is published in Animal Cognition.

For more details, see:

Domestic horses (Equus caballus) prefer to approach humans displaying a submissive body posture rather than a dominant body posture.
Amy Victoria Smith, Clara Wilson, Karen McComb, Leanne Proops. Animal Cognition, 2017; DOI: 10.1007/s10071-017-1140-4
Effects of longer day length on pregnant mares

Artificial light has been used to mimic longer day length and hasten the onset of seasonal reproductive activity in mares. Extending the day length to about 16 hours is now a common management tool on horse breeding farms.

Research by Dr Barbara Anne Murphy and colleagues showed that shorter wavelength (blue) light is particularly effective at suppressing melatonin secretion in the horse and initiating ovarian activity. This led to the development of Equilume, a device which provides low-intensity blue light (468 nm) from light-emitting diodes (LED) directed at a single eye.

Further research has now been published that shows benefits from the use of the system in mares in late pregnancy.

Foals born during the natural breeding season for the horse, (April, May and June in the northern hemisphere), tend to weigh more at birth than foals born in January, February and March. The increase in daylength as the natural foaling season progresses is also associated with a reduction in the duration of pregnancy.

A series of studies in Kentucky and Ireland compared mares wearing Equilume Light masks in their final months of gestation with untreated mares.

The researchers found a significant difference in gestation length between mares that received light therapy and those that did not. Treated mares had pregnancies 11 days shorter on average.

A separate study found that foals from light treated mares were, on average, 3.6kg heavier than foals from untreated mares.

The researchers also report a significant effect on foal birth coat. The third study, conducted in Ireland, compared the weight and length of hair taken from the mane of foals within 48 hours of birth. Foals born to light-treated mares produced mane hair that was significantly lighter and shorter than foals from untreated mares.

The researchers comment: “Collectively, these studies serve to highlight the influential role of the circa-annual changes in photoperiod length on the pre-partum mare for normal foetal development during the natural breeding season.”

They add “It also emphasizes the potential that exists to improve breeding efficiency parameters by artificially simulating this important environmental cue in the latter stages of gestation against the backdrop of an economically driven early breeding season.”

For more details, see:
Artificially extended photoperiod administered to pre-partum mares via blue light to a single eye: Observations on gestation length, foal birth weight and foal hair coat at birth.
Nolan MB, Walsh CM, Duff N, McCarren C, Prendergast RL, Murphy BA.
doi: 10.1016/j.theriogenology.2017.06.012

Hoof Search - new information service

Wherever there are professionals involved in hoof research, the push is on to share publications, data and awareness. If you are interested in the foot and lameness, HoofSearch could be what you have been waiting for.

Fran Jurga, publisher of the Hoof Blog, who is behind the new venture, explains:

"Each month’s HoofSearch edition covers the wide world of hoof and lameness research: It wanders into stable management, collects new papers on arena/track surfaces, surveys research on racing safety and injury, and brings you specific papers on breed/sport foot problems and lameness. Of course, it delves deeply into laminitis and the latest research on insulin dysregulation, as well as navicular disease, imaging, diagnostics, anatomy, biomechanics and much more."

For more details, and a link to a free copy, go to: https://goo.gl/hJTIST
Przewalski’s horses diet changed since returning to the wild

A scientist from the Faculty of Biology at the Lomonosov Moscow State University (MSU), together with her colleagues, has explained the changes in modern Przewalski's horses' diet that have occurred since the end of the 19th century. The results were published in the Scientific Reports journal.

Przewalski's horse is a species of wild horse, which used to live in the Gobi Desert. They became extinct in the wild in 1968. Several individuals survived in zoos, and successful breeding programmes around the world led to their reintroduction to their natural habitat.

Dzungarian Gobi was the last region where they lived, and the wild horses had been exterminated too quickly to have a clear understanding of whether they prefer desert or steppe habitats. Thus, different natural zones were chosen for the reintroduction. However, over 20-years' experience of the horses living wild in Mongolia has shown that in Dzungarian Gobi (with desert and near-desert conditions) the animals bred significantly more slowly, than in the steppe part of the country.

"The purpose of our research is to find out whether the conditions for Przewalski's horses' existence, in particular their food reserve (diet), have changed in Dzungarian Gobi since the end of the 19th century", said Natalia Spasskaya, one of the paper's authors, who holds a PhD in Biology and works as the academic secretary of the Zoological Museum of M.V. Lomonosov Moscow State University.

To answer this question, the researchers studied the quantity of the stable carbon isotope 13C in the Przewalski's horses' tail hairs. Because horses' tail hairs grow at a regular rate, and are not affected by seasonal moulting, they act as an archive storing the isotope values at each growth stage. The longer the hair, the farther back into the past the researchers can look.

Different quantities of this isotope are present in the cells of herbaceous plants and grass than in those of woody plants. When the plants are eaten the isotope is incorporated into molecules in the animal's body (in this case hair). By measuring the amount of 13C in the hair it is possible to deduce whether the animal was grass-eating or leaf-eating.

Przewalski’s horse tail hair from museum specimens kept at the RAS Zoological Institute in Saint-Petersburg and in the Zoological Museum of MSU, was used for the study. The horses had been hunted in the Dzungarian Gobi in the 19th century. The researchers compared the results to hair of modern Przewalski's horses, reintroduced to Dzungaria. Also, as a control of the results, a similar study, also using museum specimens, was done on khulans (the Asiatic wild ass), which also inhabits the Dzungarian Gobi.

Through their studies, the researchers found that the present day Przewalski's horses feed on grasses and herbaceous plants throughout the year. In contrast, samples from 19th century horses showed that in the winter their diet changed to leaves of shrubs. These seasonal characteristics of Przewalski's horses diet in the past were probably linked to the animals being expelled from the steppe habitat, which they preferred, to the near-desert habitat by the local people and their livestock. Living in the scrub helped the horses, among other things, to hide from the hunters.

Reintroduced horses are treated differently now: they live in a protected area, where there are no people or livestock, and have become a national symbol and a tourist brand in Mongolia.

The study also found that, in contrast, there were no changes in eating behaviour of the khulan or Asiatic wild ass. Their usage of fodder is seasonal, like that of Przewalski's horses in the 19th century. Like them, khulans are challenged by the growing numbers of people and livestock. Earlier they were hunted actively, but even now, despite them being a protected species, there is a significant level of illegal hunting, so khulans still avoid humans. At the same time, they are more fit for arid (desert) habitats: they have more near-desert plants in their diet, and they depend on watering less than horses. Thus, in the last century, this species has not changed its eating behaviour.

"The results of the study also suggest that, in the future, the growing populations of Przewalski's horses will cause conflicts with the local cattle farmers. The future reintroduction projects - projects of resettling animals to their natural habitats - should be aimed at rehabilitating Przewalski's horses in herbaceous communities, most preferred for this species' subsistence, and must at the same time consider the higher risk of a man-induced pressure" - Natalia Spasskaya concluded.

For more details, see:

Stable isotopes reveal diet shift from pre-extinction to reintroduced Przewalski's horses
Petra Kaczensky, Martina Burnik Šturm, Mikhail V. Sablin, Christian C. Voigt, Steve Smith, Oyunsaikhan Ganbaatar, Boglarka Balint, Chris Walzer & Natalia N. Spasskaya
Scientific Reports 7, Article number: 5950 (2017)
doi:10.1038/s41598-017-05329-6
Uterine stem cells harvested without surgery

Stem cells are thought to be present in small numbers in most tissues. Under certain conditions, they can differentiate into one of several different cell types and synthesise new tissue matrix - such as cartilage, adipose tissue or bone.

They have been used therapeutically in horses for many years as a treatment option for tendon and joint injuries. These cells are commonly obtained surgically from bone marrow or fat tissue.

Researchers from Vetmeduni Vienna have now for the first time managed to harvest stem cells from the mucous membrane of the equine uterus. By taking stem cells from the uterus without the need for surgical intervention, the procedure provides an alternative with reduced pain and stress for the animals.

Until now, the stem cells needed for therapeutic purposes have usually been harvested surgically from the animals’ bone marrow or fat tissue. Researchers from the Centre for Artificial Insemination and Embryo Transfer at Vetmeduni Vienna have now succeeded for the first time in harvesting stem cells from the uterus of horses. The procedure requires no surgical intervention and the laboratory results show that the cells differentiate into cartilage and other tissues.

Unlike bone marrow or fat tissue, the uterus can be accessed non-surgically using small instruments inserted via the cervix. The harvest of mesenchymal stem cells from the endometrium, the mucous membrane of the uterus, could therefore contribute to a reduction of surgical and invasive experiments in animals.

“While the human endometrium is known to harbour stem cells, these had previously not been identified in equine endometrium,” say Elisabeth Rink and Christine Aurich from the Centre for Artificial Insemination and Embryo Transfer at Vetmeduni Vienna. The two researchers, in an international team with Xavier Donadeu from the Roslin Institute at the University of Edinburgh and Hilari French from Ross University School of Veterinary Medicine in Saint Kitts and Nevis, have now managed to confirm the presence of stem cells in the endometrial tissue of horses. The data on the isolation, culture and characterization of mesenchymal stem cells from the equine endometrium was published in the journal Stem Cell Research and Therapy.

For the study, uterine tissue samples were collected from six mares. The team then separated suspected stem cells from endometrial epithelial cells and expanded these in cell culture. The isolated cells were then identified as potential stem cells using various molecular biology techniques.

“The laboratory analyses, such as immunohistochemistry, genetic analysis and flow cytometry, aimed to identify the stem cells through specific cell markers, i.e. the expression of genes and the presence of certain surface proteins,” explains first author Elisabeth Rink. For comparison with the endometrial cells, stem cells obtained from the bone marrow by traditional surgical techniques were analysed in the same way.

Cells obtained from the uterus clearly expressed the same markers as bone marrow stem cells. Furthermore, the scientists were able to show in cell culture conditions that the endometrial stem cells differentiated into fat, bone, cartilage and muscle cell lines.

“The endometrium provides a source of mesenchymal stem cells that can be easily accessed with little stress to the animals. The cell culture results show that these cells can be of benefit not only in the treatment of uterine conditions, but that they can also replace the need for surgically obtained stem cells for therapeutic purposes in other tissue types,” concludes senior researcher Christine Aurich.

For more details, see:

For the first time in more than a century kulan – or Asiatic wild ass – are now roaming the central steppes of Kazakhstan.

On 24th October 2017, a first group of nine animals was released into an acclimatisation enclosure on the edge of the Altyn Dala protected area in central Kazakhstan. The animals had been transported 1200 km by helicopter from Altyn Emel National Park in the southeast of the country. They will be released in early spring.

This is the first step in a multi-year project that aims to restore the full range of large herbivores to this unique area of steppe habitat.

Kulan once ranged across the Middle East and Central Asia – from the Mediterranean to the east of Mongolia. During the last two centuries, their range has been dramatically reduced to less than 3% of their former range. Although the species is doing relatively well in Mongolia, the Central Asian subspecies is classified as Endangered and only persists in small isolated populations in Turkmenistan, Kazakhstan and Uzbekistan.

In Kazakhstan, large parts of the central steppe – an area equal to the size of France – have become almost empty of people and livestock after the breakdown of the Soviet Union. This situation has created an almost unique opportunity for landscape-level biodiversity conservation and species recovery.

The current project aims to move 30-40 kulan from Altyn Emel to the central steppes during the next 3-4 years.

“The initial translocation of nine animals this year was a pilot project to test the methodology and logistics of animal capture, handling, transport and release,” says Petra Kaczensky, research scientist from Norwegian Institute for Nature Research (NINA), who co-coordinates the project.

A kulan foal takes its first steps to freedom in its new home in Altyn Dala. Photo: Daniel Rosengren FZS

“The approach using a corral to capture animals, chemical immobilisation for handling, a helicopter for transport, and a large acclimatisation enclosure at the release site worked rather well. For future years we will do a bit of fine-tuning,” Steffen Zuther, project leader of the Altyn Dala Conservation Initiative and main implementation partner in Kazakhstan, points out.

The project is coordinated by the Norwegian Institute for Nature Research (NINA) and implemented with the Association for the Conservation of Biodiversity of Kazakhstan (ACBK) in partnership with the Committee of Forestry and Wildlife (CFW) of the Ministry of Agriculture of Kazakhstan, the Royal Society for Protection of Birds (RSPB), Frankfurt Zoological Society (FZS) and Nuremberg Zoo within the framework of the Altyn Dala Conservation Initiative (ADCI). Technical veterinary assistance was provided by the Wildlife Conservation Society and the University of Veterinary Medicine, Vienna, Austria”.

Source: Norwegian Institute for Nature Research

The microbiome, comprising the host microbes and their respective genes, is now recognized as critically important to the host. The micro-organisms inhabiting the intestinal tract fulfil numerous functions including digesting food that otherwise their host would not be able to use, stimulating immunity in young animals, and producing vitamins.

In humans, the modern lifestyle is associated with a different, less diverse, bacterial population in the intestinal tract compared with that of our hunter-gatherer ancestors. This difference has been implicated in conditions such as immune mediated and metabolic disease.

Do similar differences exist between domesticated horses and wild horses?

An international study, with collaboration between researchers in USA, Denmark and France, has been investigating. Jessica L. Metcalf and her colleagues compared the faecal microbiome of 44 wild Przewalski horses (Equus ferus przewalskii) in Seer, Mongolia, with that of 28 domesticated horses (Equus ferus caballus) maintained on adjoining grassland. The work is published in Scientific Reports.

The research team analysed faecal DNA extracts to reveal information on the bacterial content of the faeces. The bacterial populations of the large intestine of the horse are not uniform throughout its length. However, faeces provide an excellent, non-invasive way of assessing the microbial populations of the horse’s large intestine as a whole. Faecal microbiomes are very similar to the microbiome of the dorsal colon, but also include many of...
Continued....

the microbial taxa that are present in the ventral colon and cecum, where most of the fibre fermentation takes place.

The researchers found that the faecal microbiome of Prezewalski’s horses contained a more diverse community of bacteria compared to domestic horses. They also found a distinctly less diverse microbiome in four Prezewalski’s horses that had been born in captivity in European zoos compared with those that had been born in natural reserves in France or Mongolia.

Faecal analysis also revealed some differences in the composition of the diet. The Prezewalski’s horses diet included some plants (such as sea buckthorn) which was not found in that of the domestic horses. Such differences may partly explain some of the differences in the microbiomes. 

The authors conclude that their findings suggest that human activity can dramatically reshape equid gastrointestinal microbiomes. This has broader implications for the conservation management of endangered mammals.

For more details, see (full text available):


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**Research highlights need for new approach to laminitis**

A new review published in The Veterinary Journal, demonstrates how University of Liverpool led research has changed the way we think about a crippling disease of horses.

Laminitis is one of the most serious diseases of horses, ponies and donkeys. It is a painful condition of the tissues (lamellae) that bond the hoof wall to the pedal (coffin) bone in the horse’s hoof. Severe and recurring cases of laminitis can cause chronic painful lameness or result in the horse being destroyed to prevent further suffering.

For the past decade, researchers, led by Professor Cathy McGowan from the University’s Department of Equine Clinical Science and Institute of Aging and Chronic Disease, have systematically investigated laminitis caused by hormonal dysregulation, endocrine laminitis.

She led ground-breaking research that showed laminitis was directly caused by insulin, an important hormone involved in dietary glucose (from carbohydrates) control, which overturned previous held theories of laminitis. This new knowledge has now paved the way for improving the veterinary industry’s understanding of this terrible disease, and improving future research and treatment.

Professor McGowan’s understanding of abnormal insulin regulation stemmed from her work as a veterinary specialist where she has treated many horses and ponies with endocrine disease - she noticed that what they had in common was abnormal insulin regulation.

The researchers highlighted three major advances in the understanding of this disease.

First, laminitis is now considered to be a clinical syndrome associated with a disease that affects a number of organs and tissues, or affects the body as a whole (systemic) or altered weight bearing rather than being a discrete disease entity.

Next, laminitis associated with the endocrine system, endocrine laminitis, is now believed to be the predominant form in animals presenting (primarily) for lameness.

These simple but important paradigm shifts have several implications, the main one being that an accurate diagnosis of the associated systemic disease (most commonly endocrine disease) would be pivotal for laminitis management, prognosis and the prevention of recurrence.

Third, from a series of histological studies Professor McGowan led in conjunction with Veterinary Pathologist Janet Patterson-Kane and PhD student Ninja Karikoski, showed that under the microscope, the changes in the hoof lamellae were subtle in comparison with previous descriptions and most importantly, there was evidence of a prolonged subclinical phase in at least some horses, as evidenced by the development of divergent hoof rings visible on the hoof wall.

These hoof rings may signify a vital window of opportunity for horse owners and their veterinary surgeons to recognise and apply therapeutic intervention before painful laminitis occurs.

Under the microscope it was clear that instead of severe basement membrane failure (as had been proposed based on experimental models in severely systemically ill horses), stretching and elongation of the lamellar cells is an early and key event in the disease and this knowledge will inform research directions in the future.

Professor McGowan, Head of Department of Equine Clinical Science said: “These findings completely change the way we think about a very important disease in horses. This is very important to the equine industry and veterinary profession and will be the basis of future research directions.

For more details, see:

Fewer injuries in NZ racehorses

Thoroughbred racehorses in New Zealand are at lower risk of musculoskeletal injuries than those competing in other countries, according to a recent study.

Charlotte Bolwell and colleagues at the Massey University’s Equine Research Centre examined New Zealand race records and Stipendiary Steward’s reports over six racing seasons. They included data from all Thoroughbred flat race starts in New Zealand between 1 August 2005 and 31 July 2011. During this time there were 188,616 race starts for 16,646 individual horses.

Only 177 horses failed to complete a race for health-related reasons. These included musculoskeletal injuries (MSI) (fractures or tendon /ligament damage) which accounted for 0.72 per 1000 starts (of which 0.41 in 1000 were fatal) and cardiac /respiratory events (0.21 per 1000 starts).

The rate of musculoskeletal injuries during a race was lower than that reported for other racing jurisdictions. For example, in the United Kingdom, a race-day MSI incidence of 2.1 per 1000 starts has been reported.

There may be differences in the training programmes and racing schedules for horses in the southern hemisphere, which may have contributed to the low rates reported in this study. Identifying those might enable changes to be made to reduce the risk of injury.

The research team identified some factors that influenced the risk of horses failing to complete a race for health-related problems.

The condition of the track and the length of the race had a significant effect. Tracks that were described as “dead” or “slow” showed reduced incidence of musculoskeletal injuries, compared with “good” tracks. Longer races (>1671m) were associated with significantly more musculoskeletal injuries than were races of <1200m.

Dr Bolwell says, “while we can speculate that the lower rate of musculoskeletal injuries may be due to the management and training of horses in New Zealand, the research requires further information about the horses’ training to make these connections or to establish other factors.”

Establishing a direct link between management and training of horses in New Zealand and the rates of injury during racing will require more work, but the numbers show that such a study is needed to protect animal welfare by further understanding what causes injuries to be lower or higher.

“For this further work to be truly effective, it will need to involve the cooperation of international bodies so that regional similarities and differences can be measured across all racing jurisdictions.”

“To obtain a better understanding of the injuries associated with racing in New Zealand, there is a need for greater robustness and standardisation of descriptors used to record veterinary events occurring during a race; including the site on the horse, type of injury, and location on track where the event occurred.”

“This is urgently required in order to facilitate future studies to understand the characteristics of the low rate of racing MSI in New Zealand.”

For more details, see:

Epidemiology of Musculoskeletal Injury during Racing on New Zealand Racetracks 2005–2011
Charlotte Bolwell, Chris Rogers, Erica Gee and Wayne McIlwraith.
Animals 2017, 7(8), 62. doi:10.3390/ani7080062

## Promising new gene therapy treatment for tendon injuries

A new gene therapy shows promise for treating tendon injuries according to a report published in the journal Frontiers in Veterinary Science. The authors claim the technique gives much faster healing than current methods and could significantly reduce relapse rates.

Scientists at Kazan Federal University, Moscow State Academy and The University of Nottingham collaborated in the work.

Milomir Kovak of the Moscow State Academy of Veterinary Medicine and Biotechnology, with Yaroslav A Litvin of the Kazan Federal University, and others, described the use of gene therapy in two horses with naturally occurring injuries of the suspensory ligament or the superficial digital flexor tendon (SDFT).

Two male dressage horses were the subjects of the study. One had desmitis of the lateral branch of the suspensory ligament; the other, tendinitis of the superficial flexor tendon.

The treatment involved introducing genes for two specific equine growth factors into the damaged tissue. Plasmid DNA (pDNA) was used to carry genes for equine vascular endothelial growth factor (VEGF) 164 and fibroblast growth factor 2 (FGF2). Both the genes were derived from horses, resulting in the biosynthesis of natural horse proteins in the treated animals.

The authors explain: “VEGF164 is a member of a large VEGF proteins family, which promotes proliferation and migration of endothelial cells. FGF2 stimulates proliferation of cells, regeneration of nervous, muscular, and connective tissue.”

The pDNA was injected directly into the affected structures under ultrasound guidance on one occasion. Progress was monitored by clinical examination and ultrasound scans.
Two to three weeks after the treatment, the authors report that the horses could walk and trot. Within just two months they were back to full health, galloping and competing in dressage competitions.

Professor Albert Rizvanov, who led the study and is based at Kazan Federal University, said: "Advancing medicine, relieving pain and restoring function were the main aims of this study. We have shown that these are possible and within a much shorter time span than treatments available at the moment. In addition, we could use this type of therapy in other injuries and in many other situations ranging from fertility problems through to spinal cord injuries.

Dr Catrin Rutland, Assistant Professor of Anatomy and Developmental Genetics at the University of Nottingham, said: "This pioneering study advances not only equine medicine but has real implications for how other species and humans are treated for lameness and other disorders in the future. The horses returned to full health after their injuries and did not have any adverse side effects. This is a very exciting medical innovation."

The authors conclude: "Since these preliminary case reports demonstrated improvement in clinical outcome and no adverse side effects, a larger clinical trial is ongoing to further study efficiency of direct gene therapy for the treatment of horse tendinitis and desmitis."

For more details, see:

Gene Therapy Using Plasmid DNA Encoding Vascular Endothelial Growth Factor 164 and Fibroblast Growth Factor 2 Genes for the Treatment of Horse Tendinitis and Desmitis: Case Reports.

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Tetanus is one of the oldest known diseases of horses. Characterised by muscle stiffness, inability to open the mouth (trismus) and protrusion of the third eyelid, it is caused by the neurotoxin produced by the bacterium Clostridium tetani. Cases often occur sporadically.

To better understand the condition, a multi-centre retrospective study was carried out to examine clinical data of hospitalized adult horses and foals with tetanus. Researchers at twenty university teaching hospitals and private research centres in Western, Northern and Central Europe took part in the study, which also aimed to identify factors that could help guide the prognosis of affected animals.

A report of the work is published in the Journal of Veterinary Emergency and Critical Care.

Case records from between 2000-2014 were included in the study, giving a total of one hundred and fifty-five adult horses (>6 months) and 21 foals (<6 months) with tetanus. Mortality rates were 68.4% in adult horses and 66.7% in foals.

The value of vaccination was demonstrated as most affected animals had not been vaccinated, although four adult horses developed tetanus despite being vaccinated. One of those horses died, but there was some doubt whether it had indeed been vaccinated. The other three showed only mild or moderate signs of tetanus.

Two foals developed tetanus despite receiving tetanus antitoxin at birth.

For adult horses, the researchers report that the most common infection sites were castration, hoof abscesses, and other wounds. Tetanus in foals most often resulted from umbilical cord infections and wound infections.

Stiffness was the most commonly observed initial clinical sign.

Signs associated with a good chance of survival included: standing on admission, normal intestinal sounds on admission. Horses that could eat or drink voluntarily were more likely to survive.

An interesting finding was that the outcome did not differ between different tetanus antitoxin (TAT) dosages, although there was a trend of increasing survival rate with increasing TAT dosages.

The authors point out that this is a risk analysis and by no means provides clear-cut answers for all clinical cases.

They explain; "Although the presence of a specific poor prognostic clinical parameter carries an increased analytical risk for non-survival, outcome is not necessarily poor; chance of survival is just expected to be lower than when the specific variable is absent. Therefore, the authors recommend to base irrevocable decisions of euthanasia on the presence of multiple poor prognostic indicators, or when those indicators do not improve following treatment."

They conclude: "Prognosis for equine tetanus is poor with similar outcome and prognostic factors in foals and adults."

"Several prognostic indicators relate to the ability to eat or drink, and more severe clinical signs relate to poor outcome."

"Increasing intravenous dosages of TAT has no significant effect on outcome, but the positive trend identified may support a recommendation for high intravenous TAT dosages. Further evaluation is warranted."

For more details, see:


doi: 10.1111/vec.12668
A toxin extracted from shellfish shows promise as a safe and effective long-lasting treatment for horses with bucked shins.

Neosaxitoxin is produced by photosynthesis in phytoplankton and cyanobacteria. It may be concentrated by shellfish, and is one of the toxins responsible for Paralytic Shellfish Poisoning (PSP). It blocks nerve transmission by reversibly binding to receptors in sodium channels, and can be fatal if ingested.

Bucked shins (dorsal metatarsal disease) is a painful, acute periostitis of the dorsal surface of the third metacarpal bone. It is seen most commonly in the forelimbs of young Thoroughbreds (2-yr-olds) in training and racing.

Neosaxitoxin has been used as a long-acting analgesic in human medicine. Would it be effective as a long-lasting analgesic in horses with bucked shins? Gricel Riquelme and co-workers in the Membrane Biochemistry Laboratory, Department of Physiology and Biophysics, Faculty of Medicine, University of Chile, Independencia, investigated.

They assessed the response in 14 horses diagnosed with bucked shins, from Club Hípico Racetrack in Santiago, Chile.

Horses were treated with one of three concentrations of neosaxitoxin injected under the skin at the top of the affected metacarpal. The research team assessed the response by monitoring lameness and noting the sensitivity of the affected area to pressure.

They found a significant improvement in pain, measured both by the abolishing of lameness and an increase in the pressure tolerated before lifting the leg. The duration of response was dose dependent, with administration of 600 micrograms being effective for up to 3 weeks.

The researchers conclude that neosaxitoxin infiltration provides safe and effective pain control in bucked shins without adverse side effects.

For more details, see:
Neosaxitoxin, a Paralytic Shellfish Poison toxin, effectively manages bucked shins pain, as a local long-acting pain blocker in an equine model
https://doi.org/10.1016/j.toxicon.2017.11.004