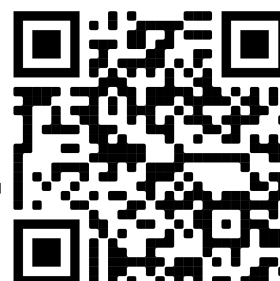


HorseTech Market Report

9TH EDITION (JUNE 2023)



Scan this QR Code
to download a copy



Collaboratively produced & curated by David Doherty.

Download the Latest Updated Edition at
HorseTechConference.com/Market_Report/



Tom MacGuinness
Founder

HORSEPAL

The history of HorseTech goes back millennia to times when equestrians studied animal psychology to refine training methods and toiled to forge iron shoes for their steeds. Today big bets are being made on tech and the most expensive mistake that can be made is if you fail to pay attention to the tech that can help you be better at your work.

Technology can make life easier for horse and rider and can also drive sustainable growth in the equine industry. Ground breaking research can advance equine health outcomes but many of the greatest opportunities arise by simply disseminating ways of doing things that we already know work better.

Like most people I'd be lost without my smartphone. It's an invaluable tool that provides me with fingertip access to practically everything I need to know about my horses and how to get the best from them. Apps let me check on my horses, record the timings of my rides, get notifications, share and learn new ideas

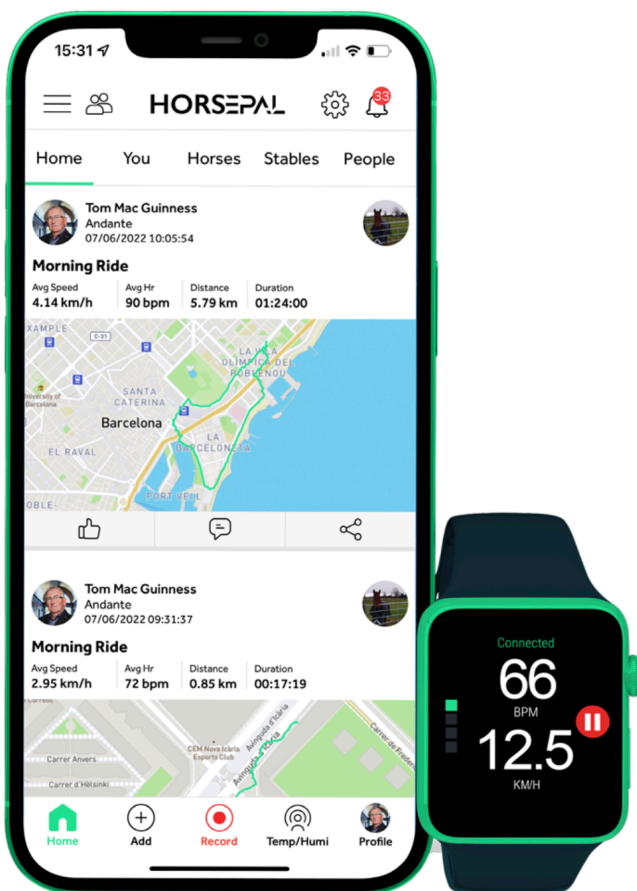
and techniques, and keep up to the minute with developments in my stables wherever I am in the world. To think that all of this would've been impossible just a decade ago without a team of engineers & programmers yet now we've come to expect it to all just work for a cost that's less than our water bill.

I was born into the equine industry and pioneered HorseTech innovations starting with the humble rug. Horseware incorporates the very latest material and medical sciences and retails online and through incredible distributors across six continents, yet I've yet to meet anyone who has any real idea about the size, scale or diversity of the HorseTech Market.

I learnt first hand that it's not enough to build a better horse rug and think the world will build a path to your door - we must be prepared to innovate, listen to feedback and continually improve what we're producing. tool. We can learn from other sports that have successfully innovated with technology (for example Formula 1 Motorsport has greatly expanded it's fanbase and their engagement. while creating. valuable commercial spin offs in areas such as automobile safety, crash protection, computing, material science, engine performance and reliability, design, international audience engagement, etc) and I think some of the big opportunities lie in innovations such as health optimisation and maintenance, disease prevention, regenerative and anti-ageing medicine, microbiome therapies, and the creation of new expectations for human health.

I hope that the production of this completely free collaboratively produced HorseTech Market Report will go some way to start helping bring clarity and wider awareness of the passion for innovation that naturally lies within equestrians and I encourage you to use it to advance the work you do with your horses, generate new ideas and contribute your thoughts and suggestions.

Horsepal.com presents a New Frontier in Equine Management, your Own Personal Assistant in the yard and a Social network for Horse riders enabling them to connect with friends & share their adventures. It turns your Smartphone and Smart Watch into a sophisticated tool for riding, monitoring and management of your horses activity, performance and Health data.



Foreword	2	Hoof Care	73
Tom MacGuinness, Founder, HorsePal.com		Fran Jurga, HoofCare Publishing	
Introduction	4	Ophthalmology	80
David Doherty, Curator, HorseTech Market Report		Craig Robertson, Epipole	
Water	7	Artificial Intelligence	83
David Doherty, WEO Equine		Aidan Connolly, President & CEO, Cainthus	
The Stable Environment	13	Nutritional Hydrotherapy	86
Sam Murphy, Founder, Equilux Lighting		Sandra Murphy, Founder, Equidiet	
Transportation	17	Nutrigenomics	89
David Doherty, Curator, HorseTech Market Report		Prof Emmeline Hill, Equine Geneticist & CSO, Plusvital	
Surfaces	19	Stem Cell & Regenerative Medicine	92
John Ormonde, Founder, John Ormonde Wexford Sand		Tim Watson, Lipogems Equine	
Infection Control & Biosecurity	22	HorseFirst Innovation & Translational Medicine	95
Maxine Franklin, AGMA Holdings		David Doherty, Curator, HorseTech Market Report	
Fire Safety	27	Psychology	101
Brad Wilson, Equiprotect		Kerry M Thomas, Founder, THT Bloodstock	
Intelligence Research	29	Identity	103
Ed Dutton, Researcher		Philip Carberry, MustangChain.io	
The Equine Semaphore Code	36	Vaccine Records	105
Meljay Turner, Author		Dr Barbara Blasko, Founder, ElectronicVet	
Audiology	38	Environment & Waste Management	107
Daniel Ferland, Ossicles Inc		Shelly Townsend, CEO, Equine Eco Green	
Intestinal Microbiome	41	Wearables	110
Dr James Gibbons, Microbiologist, Irish Equine Centre		Jeffrey Schab, Founder & CEO, Protequus	
Salt Therapy	43	Chatbots	116
Richard Butterworth, Equine Salt Therapy		David Doherty, Curator, HorseTech Market Report	
Pharmacy	46	Websites & Social Media	117
Hemant Patel, Pharmacist		Ashley Neely, Bluegrass Horse Feeds	
Laser Therapy	48	International Trade	119
J Mark Strong, Director, Multi Radiance Medical		Michael Brady, Trade Agent	
Anti-Ageing & Longevity	51	Copywriting	120
Prof Sam Lingam, Consultant Paediatrician		Paul Jones, PJ Copywriting	
Telomere Science	53	Branding	123
Dr Bill Andrews, Sierra Sciences		Amanda MacDonald, FullGallop Communications	
The Horse Genome.	57	Foaling Monitors	125
Prof Emmeline Hill, Equine Geneticist & CSO, Plusvital		Andrea Banchio, EquineVet & FoalingAlarm Consultant	
Anti-Doping	60	Natural Language Interfaces	128
Mike Payton, Event Log Limited		Shawn Wilkie, CEO, talkatoo.com	
Retraining & Aftercare	63	Astrology	131
Keith Johnson, President, AmTote International Inc		David Doherty, Curator, HorseTech Market Report	
Ownership	65	Sound & Vibrational Healing	133
Shayne Heffernan, Economist & Funds Manager, HEFFX		Sharon Quigley, Pythagoras Institute of Vibrational Healing	
Apparel	67	Secure Messaging.	137
Louisa Williams, Horseware Ireland		Lazlo Borbiero, Software Engineer & Support Specialist, LaneTelecom	
Imaging	70	Bios/Contact details of Report Contributors	140
Gavin Mitchell, Managing Director, IMV Imaging			

INTRODUCTION



David Doherty,
Curator, HorseTech
Market Report

It's never easy to spot disruptive innovations that develop from outside your industry. Just as our ancestors would've thought it unthinkable that the noisy/dirty/unreliable combustion engine in the 'horseless carriage'

would lead us on a technological journey to a day when most of us no longer live in partnership with horses. In 2020 we now face the prospect of communities indoctrinated and controlled by technology getting to decide if there is to be a future relationship between mankind and the horse.

The role of the horse in our modern society may be very different from the past when our lives were shared with horses (working, living, eating, sleeping, travelling and fighting with them) but we haven't yet lost all the equestrian knowledge of our ancestors and there are opportunities for us to relearn things that have been forgotten. It's critically important that equestrian leaders don't just leave the future to chance because we face the bleak prospect of losing further ground rapidly as the influence of urban modernised populations over their rural equestrian contemporaries continues to grow. The reality is most of the next billion adults have been reared with their eyes glued to strobing screens, and the relationship with the countryside and the horse are increasingly vulnerable to critically dangerous populist modern views and opinions. It's also a sad reality that major businesses in the horse racing industry stand to benefit from the demise of the sport (eg. Track owners with prime real estate that's worth more if redeveloped for

housing/retail use) or waning public interest (eg. sports betting firms make a lot more profits from sports that don't have a racing levy). The threat is most pressing in regions like California where the entire industry is now just a PETA ballot away from extinction and many citizens have little/no contact with animals and wildlife besides from relationships with pets that they treat like little humans.

When the inaugural HorseTech Conference in 2017 was live streamed we made it possible for anyone

with an internet connection to join us at the Royal Veterinary College in London and we took the opportunity to gather feedback and learn from the diverse international audiences it attracted. Key takeaways included;

*the world is full of equestrians who are excited by the vast opportunities there are to adopt technologies.

- * technology has a vital role in the creation of the next iconic heroes and personalities that are needed to share the passion for the equestrian lifestyle with the next generation.
- * the world's smartest technologists and medics are excited by the potential for the latest tech to be developed in the equestrian market first (an approach to innovation that we refer to as "HorseFirst").
- * Technology can help us better quantify and understand the horses incredible environmental sensory capacity and the unique neurological adaptations that our equestrian ancestors were selected for.



Walker Hancock
@WalkerHancock

We can all debate whether we should validate and cave to PETA, but one thing every one needs to keep in mind is it only takes ~600,000 signatures to get a measure on the ballot to eliminate horse racing in California and PETA has over 700,000 members living in the state.

12:01 PM · Mar 29, 2019 · Twitter for iPhone

In modern urban

societies the relationships we have with other species of animal are increasingly being damaged. Many parents fail to educate their children on the animal source of their food and for pets there is an epidemic of anthropomorphism with furry animals homed in centrally heated properties and under-exercised because their exercise has to be made tethered to a stumbling human. The horse has an under appreciated but fundamental role in helping connect society to its roots and acts to remind society of the fundamental value of respect for life outside of our species.

The HorseTech market is incredibly challenging because the Equine industry is so complex and dynamic. To some it is a sport, to others it is an entertainment, gaming, destination and event business, some see its role entwined in the history of their civilisation and ancestors. Behind the scenes the world's most valuable animals have attracted the most creative scientists pioneering new medicines and therapies, merging the bleeding edges of agricultural technologies and next generation medical sciences to invent a new prevention and longevity focused approach to healthcare.

Horse Racing is without doubt the world's most complex team sport and to top that it's also uniquely a team sport in which no one is actually in charge. When the public see the photo in the newspaper of the champion horse with the owners, trainer and jockey in the winners circle that great grandchildren will one day talk proudly about it's literally only the tip of a monumental iceberg, a tiny fraction of the number of people that have worked to create that victory. For most it all began many generations ago but at a bare minimum it began with the purchase or breeding of the mare and the subsequent selection of a stallion, along the way there will have been pedigree analysts, bloodstock agents, auctioneers, sales-preppers, stride analysts, farmers, veterinarians, radiologists, dentists, grooms, labourers, therapists, nutritionists, farriers, scientists, box drivers, breakers, pre-trainers, data

scientists, geneticists, microbiologists, ophthalmologists and the list goes on.

Just try to think of how many critical decisions have had to have been made to win at the highest levels and you will be astounded by the quality and pride that professionals in this industry clearly bring to their work to make it all happen. If you are ever lucky enough to get to watch these equestrians at work it's obvious from their unfailing passion that they are the real 'animal rights extremists' because they really do prioritise the lives and needs of these noble animals before even their own.

It's no coincidence that the most successful business people in the world own the best horses. This is because they fundamentally understand the vital link between good management and success. The same management skills that have made them successful in the business world are invaluable in helping to deliver a horse in the best possible health and optimum fitness on race day. Modern tech (and the Data Science opportunities that it can facilitate) enables us to introduce management systems and processes that can essentially hardwire knowledge and best practice into the way teams work and create an environment in which we are open to challenging our beliefs, can scientifically experiment with, measure and adopt innovations that enhance welfare, prevent injuries, optimise performance and improve success rates - all within time frames that are faster than those of the competition.

Most of the HorseTech profiled within this report would've been unimaginable just a decade ago. Moores' Law and the free falling cost of sensory tech, data storage and computing power mean it's now possible to collect and process volumes of data that it wouldn't have even been viable to collect just a decade ago. Dominance in all elite equestrian markets is now enjoyed exclusively by teams that have been pioneers in the use of tech or have involved specialist tech expertise to find ways to

optimise their work and it shouldn't be a surprise because at the highest levels it's increasingly cheaper and easier to buy tech than horses.

To derive value from HorseTech we need to use it to better understand and complement the age old traditions and art that has developed between equestrians and horses. By helping create a vibrant, ethical, inspiring industry that is open to new ideas and responsible innovations we can help secure and create the future role of the horse in society. It's also quite obvious that the industry is well placed to 'spin out' innovations that may be the most significant commercial opportunities known to man (eg. think of the complete revision of the \$Trillion human sickcare industry that will come about as a result of the development of the immunity boosting, regenerative medicine and anti-ageing therapies that are being pioneered in the equine market).

The demand for HorseTech can also act as a canary in the mine for environmental issues that humans are too cerebrally occupied to be sensitive to and aware of. Environmental pollutants are a good example of this eg. when we see horses refuse to drink the water we're drinking it's worth considering why we're so happy to have our children drinking it...

Another key objective for this collaboratively produced report is to reach those who have had a bad experience with technology and are inclined to dismiss new tech innovations as 'shiny new toys'. By helping readers discover new ways to discern the distinct difference between toys and tools and select the very best partners to work with we hope to add to the success, advance the science and bring improvements to the lives of horses and riders.



"If you don't like racing go and watch Peppa Pig. Racing is what it is, a wonderful sport. Horses get killed. Jockeys get injured. No one knows that better than me watching Ruby. I got injured myself it's part of the game. That's what the sport is and the 70,000 people who are here today (at Cheltenham) know that as well. Don't be pampering to those who want to stop it all altogether. They won't be happy until there's no racing so there's no point modifying it to suit them"

Ted Walsh, Champion Racehorse Trainer.



David Doherty,
WEO Equine

Life is predicated by water as there is no life without water. Remove water and life disappears. Mess with water and you mess with the primary web of life. While

water has enabled the growth of urban societies (you couldn't have cities without modern heating, ventilation and air-conditioning systems and incredibly complex and often ancient water supply and sewerage systems) it comes as no surprise to equestrians that modern industrialised societies have created problems with our water (the universal solvent).

Improving our understanding of water is key to improving the health and welfare of the horse because water is the most important irreplaceable nutrient that aids digestion (particularly important as a horse spends up to XX hours a day grazing), helps maintain temperature and provides the essential building blocks for the cells that the horse is made of. The

body of the average adult horse is composed of roughly 70% water - around 96 gallons (360kg) and it will take in 5-15 gallons (20-55 liters) of fresh water per day and excrete the same amount via the lungs, colon, kidneys and skin. A lactating mare might consume 25 gallons a day. Deprived of feed a horse can survive as long as 3 weeks but deprived of water it won't survive a week and within 2 days it may refuse to eat and exhibit signs of life threatening ailments.

Dehydration in horses can arise from strenuous exercise, stressful situations, diarrhea, dry forage, and poor water quality or

contamination. Although well adapted to dealing with less-than-pristine water sources a horse can have very powerful sensory capabilities to judge a water source and it will refuse to drink if it can. Detecting the signs of dehydration in the horse (sunken eye or dullness, lethargy, dry skin and mouth, thick saliva, skin pinch tests, etc) are key skills required of a competent equestrian and immediate requests for veterinary assistance should be made if you detect severe dehydration signs.

It's important to act whenever you notice a reduction in intake as there aren't significant reserves and when intake is reduced a horse's

body will not be able to carry out the usual biological processes required for repair/building it's body and it will also impact on the digestive processes (increasing the risk of colic impaction etc). The challenge of hydrating a horse is age old (eg. Way back in 1546 John Heywood shared the metaphoric idiom "you can lead a horse to water but you can't make it

drink") and it's commonplace to add packs of powdered electrolytes as a flavouring to encourage drinking and to see trainers transporting water from home with their horses for consumption during transport and when competing as dehydration is one of the most significant issues effecting performance.

Providing quality fresh water to your horse might seem like an easy task, but it's not always as simple as it sounds. As the universal solvent water has unique properties that enable it to dissolve virtually anything it contacts. In nature it's impossible to find a water source that is completely untouched by chemicals or



minerals and it's important to appreciate that these other substances contained in drinking water aren't necessarily bad; minerals dissolved in water impart much of its flavor and many are beneficial as they are required by the body in trace amounts.

Is this water safe for your horse?

Horses have an unimaginable ability to judge the quality of a water source and most will instinctively drink from the best/safest water source available so provide a quality water product and you will immediately be able to tell (if your horse drinks it preferentially) that your horse doesn't like their current supply. If you have a choice of waters and are unsure which is better offer a supply of each to the smartest stallion you have and drink the water that the horse naturally chooses. An easy rule of thumb to follow is if you would not drink from your horse's water source don't expect/require your horse to.

How to judge the quality of a water?

Most of the attention to the quality of a water is dedicated to what is or is not in water, and not to the water itself. As such water quality is typically decided based on a laboratory analysis to test for acidity (pH), color, dissolved oxygen, physical, chemical, and microbiological analyses. The concentrations of metals, nutrients, pesticides, radon and turbidity (a measure of the suspended particles in the water) can also be useful. The results will give you a basic, general interpretation of the conditions of a water source and will make a great starting point for a discussion with an accredited water consultant.

The 'drinking water standards' are continuously being revised and lengthened to enforce controls on the level of contaminants so that the water is safe to drink. Unfortunately for equestrians a water that is safe for humans to drink is not necessarily something you want to

have your horses drinking as there are permissions for additives and contaminants that aren't regulated which when present could make your water supply useful for little beyond washing their equipment and stables.

One reliable indicator of water quality in your barn is the total amount of dissolved solids (TDS) which is the sum of the concentrations of all organic and inorganic substances dissolved in the water, including mineral salts, algae, bacteria, nitrates, and solid particles of debris. Between 1,000 and 2,999 parts per million TDS is considered satisfactory for livestock, with around 6,000 ppm the usual upper limit for safe drinking water for horses. At levels above 1,000 ppm, your water may have an offensive smell, taste, or color—and a 1998 study conducted by the Equine Research Centre in Guelph, Ontario, found that equine diarrhea is a common complaint on farms with water TDS levels in excess of 1,000.

Your local laboratory can test your water for levels of calcium, magnesium, manganese, iron, copper, zinc, sodium, chloride, and lead, as well as sulfates and nitrates (nitrate contamination is particularly common on horse farms; its likely source, your manure pile). Concentrations of these minerals, if sufficiently high, can also have an impact on your horse's dietary balance, as levels of one mineral in the gut can often influence the ability to absorb another. Some minerals, such as iron, calcium and magnesium, are chiefly a concern because they can clog your plumbing with scale and deposits and change the water's color and taste. Other minerals, such as lead, are more worrisome because they can build up to toxic levels.

An acidity/alkalinity test is another frequently performed water analysis. Water testing below pH 6.5 is considered acidic and can contribute to the corrosion of your pipes. (Acidic water isn't necessarily as nasty as it sounds, however—a can of carbonated soda may be up to 100

times more acidic than water with a pH of 5.0.) On the other hand, if your water tests at pH 8.5 or higher, it has a lot of alkaline, which means you probably have crusty mineral deposits on your pipes and fixtures. A sudden change in your water's pH can be a heads up for damage to your well as the pH levels in water usually fluctuate very little over time.

If your water has an unpleasant smell or your horses refuse to drink it, test for the following: pH, copper, lead, iron, zinc, sodium, chloride, TDS, and hydrogen sulfide. If your water is cloudy and frothy, test for turbidity (cloudiness, caused by mud, algae, and solids), TDS, and detergents. If you live near a road salt storage site, a street that is heavily salted in winter, or the ocean, test for sodium and chloride levels. If your water tests reveal an imbalance or contamination consult the lab that did your testing for its recommendations.

Maintenance

Troughs and waterers will need to be cleaned and refilled regularly. Leaves, chaff, insects, and other debris should be cleared out daily. Containers can be scrubbed out with a bristle brush and apple cider vinegar, then rinsed well. The frequency will depend on how clean the water stays and how quickly the algae grows. You may need to clean your trough at least once a week during the hot summer months and less frequently during the colder weather. In sunny summer weather, algae growth can be a problem. And, standing water can harbour mosquito larvae.

Natural Water Sources

Natural water sources such as ponds, streams, lakes and wells can provide horses with drinking water but owners must be careful to ensure via regular monitoring that they aren't polluted by harmful agricultural chemicals and environmental contaminants caused by run-off. Not all algae produces harmful chemicals but blooms are indicators of unhealthy or

stagnant water and blue-green algae bloom can be a source of cyanotoxins that are extremely dangerous for horses (can cause muscle tremors, labored breathing, bloody diarrhea, liver damage, and even convulsions/death). Algal growth is usually associated with large amounts of organic material in the water, often as a result of run-off from nearby fertilized fields.

To avoid potential problems with natural water sources, it is best to provide additional water in a bucket or trough so that your horses always have a choice. Not all natural water sources are problematic just as not all artificially provided waters are safe. Keeping a careful watch over the water your horses are drinking will allow you to detect contamination issues before they cause illness, dehydration, or colic.

Testing a well's water for bacterial contamination on an annual basis is sound practice. A total coliform test checks the water for bacteria normally found in the soil, in surface water, and in human and animal waste. Coliform bacteria are not, in themselves, considered harmful, but their presence in your water supply is an indication that your well may be contaminated either from run-off from a manure pile, from a nearby septic bed or tank, or from fertilizer or manure spread on a nearby farmer's field. Coliform levels can rise in drought conditions, with sudden heavy rainfalls, or with any unusual change in weather patterns. It's also possible to have high coliform levels when the well has developed physical defects, such as a broken or missing cap that could allow debris, surface water, insects, or rodents inside.

Doing bacterial testing is a good idea whenever there is a noticeable change in the colour, odour, or taste of your water; when any animal or person on your farm becomes sick from a disease such as Potomac horse fever or Salmonella; when the water supply system on your farm has been disassembled for repairs;

when spring flooding occurs near your well; or when the cap or the interior of the well has been damaged.

Wells that are correctly drilled, sealed, and more than 50 feet deep generally have less chance of becoming contaminated with bacteria. Water from an old or shallow well should be tested more frequently. Don't rely on "clean" tests from a neighbour's well. Even two wells side by side can draw water from separate aquifers (underground water sources) and yield very different results.

Well water often contains significant concentrations of dissolved minerals that can influence the taste, smell, and palatability of your water. (The classic example is "sulfur water," which has that unmistakable rotten-egg stench.)

Municipal Water Supplies

If your barn draws its water from a public or municipal system that provides extensive purification and filtration services and also regularly tests its water for contaminants such as disease-causing bacteria, toxic chemicals, and even radioactive elements such as radon you should have few worries but it's important to be aware of the possibility of contamination because the testing is done at the source, and if there is damage to the delivery line or a problem with the plumbing on your property, your water could still be compromised. Local authorities increasingly provide SMS/email notifications to users to make them aware of problems so avail of these because you may be able to better prepare for water shortages and avoid issues when authorities flush their systems (typically once a year or after works to remove contamination left in the pipe after installation or the dirt and debris that settles out of the water over time) especially if you have automatic feeders.

In addition consistent maintenance is required eg. If the water in a trough appears green or

murky, it needs to be emptied, cleaned (stiff brushes and apple cider vinegar are safe tools) and the water replaced.

Additives such as chlorine (to minimize risk of bacterial contamination) or fluoride (to help improve human dental health) in the water cause lots of concern for equestrians even though the levels are considered to be below the 'maximum dietary allowance' for horses. The chloride may change the aroma and taste of the water and this can sometimes reduce water consumption that may impair performance and may also increase the risk of impaction colic. Horses do adjust to the difference in taste and aroma over time, but this may take a few days.

It is routine in many barns to flavor the water with something like wintergreen or peppermint at home, then flavor the water at the new location or while traveling to match the home water.

Nitrates

Nitrate /nitrite poisoning is not a common problem in horses however, due to serious and potentially fatal consequences of nitrate/nitrite poisoning, horse owners should be aware of the condition and understand the risk factors. Most commonly nitrates may be found where the region local to the groundwater has had significant plant decay underground. Nitrates are created as a part of the decaying process, and are able to move relatively quickly and easily through soil, owing to how soluble they are. Alternatively groundwater can become contaminated with higher levels of nitrates through animal waste run-off from dairies and feedlots, excessive use of fertilizers, or seepage of human sewage from private septic systems.

It's generally accepted that low levels of nitrates typically pose little threat to adult horses however special care should be taken with the monitoring of supplies to pregnant

mares and foals as ingestion of large amounts of nitrate can cause gastrointestinal irritation, colic, and diarrhoea, and the conversion of nitrate to the more toxic nitrite anion by gastrointestinal microorganisms. Nitrite is absorbed from the gastrointestinal tract into the blood, causing injury to red blood cells and resulting in inability of red cells to carry oxygen. Clinical signs may include difficulty breathing, weakness, tremors, ataxia, rapid heartbeat, grey/blue or brown discolouration of blood and tissues, seizures, and rapid death. Abortion can occur in animals that survive the initial clinical signs.

Pollution

Pesticides and herbicides are other common water safety worries. Though expensive, testing for these chemicals may be worth doing if you have significant concerns about the agricultural sprays being used in your area. Likewise, if you suspect solvents or other toxic chemicals may have leached into your water supply from a local industrial site, get your water tested for your own peace of mind.

Electrolytes

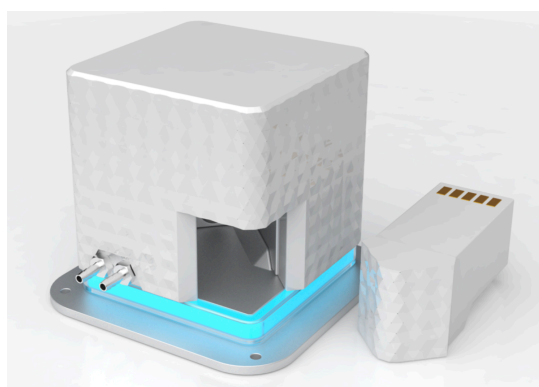
A sweating horse can lose significant water and electrolytes. Monitoring stations at Endurance events report body weight losses as high as 7% primarily due to fluid losses. Sweat losses include essential nutrients including chloride, sodium, potassium and small amounts of calcium and magnesium that unless replenished will lead to dehydration, muscular weakness, overheating, tiredness and poor performance. Dehydrated horses can have a decrease in plasma volume leading to a decreased ability to perfuse the skeletal muscle and skin,

resulting in exercise fatigue and hyperthermia. This makes it essential to ensure that horses in training are supplied with enough electrolytes to meet their specific dietary needs and supplementing it if not. Proper electrolyte balance will help horses avoid a wide variety of health complications but it will also promote rehydration and optimise a horses performance. Many commercial electrolyte supplements include sugary flavourings to increase the palatability and encourage horses to drink and these should be used only after consulting a Veterinarian if the horse is refusing to drink water but it's key to rule out any issues with the water (eg. You should be using a high quality water that the horse is familiar with and wants to drink).

Water Enhancement

We have grown up in a universe that we have understood to be infinitely large. Technology that has enabled the development of what Scientists refer to as "Quantum" science and a universe that is infinitely small. The smallest unit of mass is no longer understood to be the atom (the word 'atom' means the smallest particle of a chemical element that can exist) as we now know that these are made up of subatomic particles with their own properties and there is now nuclear/ particle physics that study how these particles can exhibit dual properties.

In 2019 tech is in place to ensure water supplies are safe and so this is becoming less of a concern for the world's leading breeders, trainers and Veterinarians but in their pursuit of optimal health and performance gains the challenge now is 'can I do more with the water I have to help recovery and optimise health'.



At Waterdiam we are working at the leading edge of this and working on proving new understandings of the world's most important molecules and bonds. One outcome of this is that we have developed "Water 3.0" a new generation of water with a new molecular structure & Oxygen-Hydrogen bonds that provides oxidative signalling that stimulates the immune system and accelerates senescent cell elimination and creates powerful anti-oxidants that provide electrons and antioxidants to cells.

In the process of authenticating our claims we have tested the Water 3.0 on more than a million animals and performed numerous scientific studies. Customers like the approach we're taking as we're not involved in introducing artificial molecules but working to just help the horse to better manage the delicate equilibriums that enable it to optimise it's own health.




The Waterdiam enhancement process has been launched in Ireland and is used with a range of water sources (eg. municipal, well and high quality mineral waters) with world leading racehorse trainers and breeders, Veterinarians and smaller equestrian centres. We have not yet found a horse that cannot discern the difference and doesn't have an immediate

+10x preference for the water (when it has been provided with two sources: their normal water & that same water enhanced with the Waterdiam technology). Most horses will drink substantially more of the enhanced water and we've seen some leading racehorses drink as much as three times what their trainer expected them to drink when they were given the enhanced water. The significant measurable health benefits (skin, lungs, recovery, immunity, skeletal etc) are noticeable within the first week and we will be publishing high quality in-depth data that is coming in from leading Equestrian centres.

If you would like to see the benefits please contact David Doherty on +353 876 745 287 or email david@HorseTechConference.com to get a free consultation on your water. We are also currently offering leading breeders/trainers in UK/Ireland a 6 week trial completely free of charge/commitment.

If you'd like to treat yourself to water that has been amplified at the molecular level preorder "Weo, The Bottle" today at:

<https://shop.we-o.com/products/weo-bottle/>



Weo, The Bottle™

\$219.00 USD

STABLE ENVIRONMENT



Sam Murphy,
Inventor/Founder,
Equilux,ie

Modern management of horses often requires them to be housed indoors for much of, if not all of the year. As a result indoor air quality, bio-security, light quality and levels can have a huge impact on their health, development and performance.

Lighting

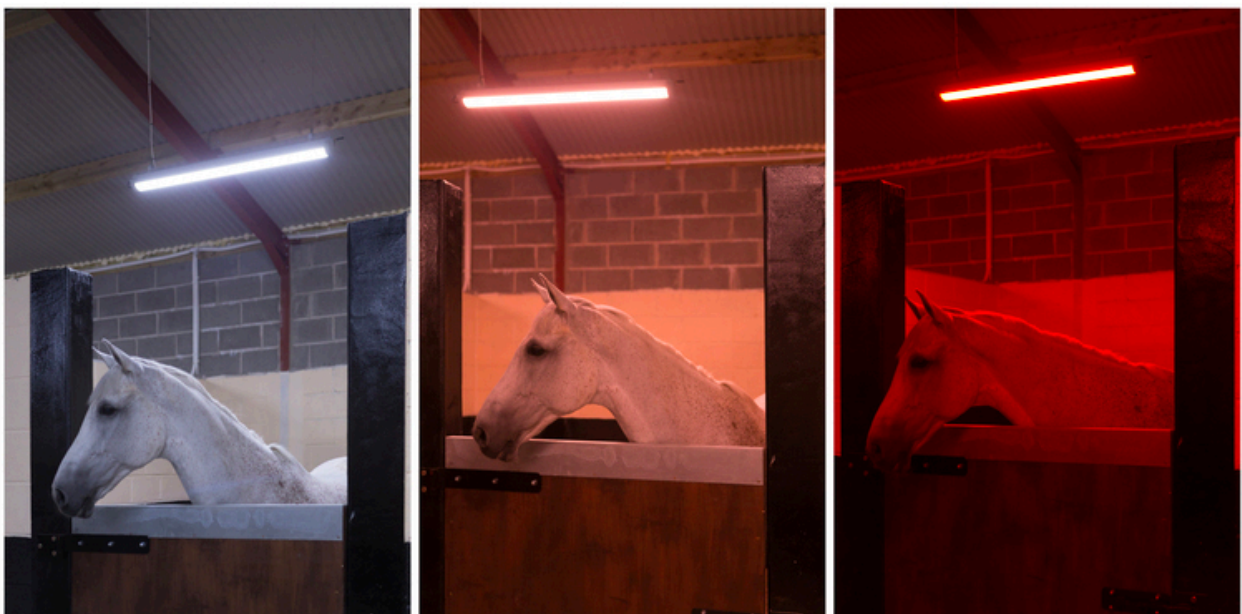
Because we require Stallions to forgo the breeding season that they would have in a natural environment and for Mares to conceive, give birth and provide lactation outside of their natural breeding season it's important to understand the value of optimising the quantity and quality of lighting.

As seasonal or 'long day' breeders a horse has a natural season that coincides with the availability of natural nutrition (grass). Mother Nature's way of insuring that a mare will not conceive at the wrong time is a process by which fertility is shut down in the off season. Feral stallions in the natural environment also experience a shut down. In the herd the

stallion will happily graze alongside his hareem showing little or no interest in them. It makes no sense for the male animal to waste valuable energy at a time when there is a shortage of nutrition and it also avoids the risk of injury in chasing after mares who are not receptive.

All grazing animals have evolved to thrive despite seasons of plenty being contrasted with months of little/no food except for the stored reserves that they have built up during the fertile season. In this regard it's helpful to try to forget the human perception of four seasons and think of an animal as recognising just two seasons. Long day and short day, rather than summer winter spring and autumn. For 6 months per year the days are longer than the nights and for 6 months its vice versa. Length of day is key to the animal's recognition of season; their clock is set by length of day and responds to change of day length. This day/night cycle is referred to as circadian rhythm and the annual long day short day cycle is referred to as circannual rhythm.

This natural clock/calendar is involved in the control of fertility, migration, hibernation and the shedding/growing of the winter coat. For



The Equilux System provides accurately timed gradual transitions from bright daylight, through dusk into dim red night light.

many years now, thoroughbred trainers have linked coat condition to the horse being "ready" describing their horses as being forward or behind in their preparation. It is quite common for a trainer to describe a horse as having "not quite come in his or her coat" and perhaps just needing a few more weeks etc. in the same context trainers and industry pundits will describe horses in the autumn of the year as having "gone in their coats" so it is clear that coat condition is used as an indicator of a horse being in prime condition. The condition of the coat shows that a horse has entered or has exited winter mode.

Horses are conditioned to enter the fertile season when the days become longer because it has been conditioned to expect the availability of unlimited food supplies that can be used for growth. The Horse also has an innate ability to know when he can and can't afford to invest expenditure in growth and development and this is easy to observe in the development of bone as that is nutritionally very expensive. Optimal growth like fertility is closely linked to the perception of nutritional availability rather than actual nutritional availability.

Shortening days indicate winter is coming and horses know that it's time to begin storing reserves in order to survive the lean period ahead. In its simplest terms a horse fed on a longer day will apportion a larger fraction of its energy to growing and developing and if fed the same on a short day they will naturally apportion less to this in favour of helping to build up their energy reserves.

In Agritech markets such as swine and poultry production it's well understood that the length of days impacts on growth and it's referred to as the "feed conversion rate". Extending the day length for a pig or a chicken will help them reach a required weight in a shorter time because the animals appreciate that this means they are in a season of optimal growth.

In the farming industry this is intensive and could be described as 'forced growth'. In an elite equine athlete forced or accelerated growth is not desirable or required, however it can be done in a much more subtle way, looking for marginal advantage with controlled optimal growth obtained over an extended period of time.

Equilux Performance Lighting was developed in Ireland by Sam Murphy as a system to help reliably control both circadian and circannual rhythm in horses and in just a few years it's become widely used by more than 100 of the top thoroughbred stallions in the world with compelling results. By providing control of all aspects of light within a stable (including the wavelength of the light so that it accurately replicates natural outdoor light and peaks in the blue wavelength that has been proven in extensive research and testing to be beneficial to horses) we can calculate and accurately set the alteration of the day/night cycle so that a horse will naturally advance to the long day season quicker and also offset the start of the Autumn. By elongating the season the horse will benefit from a longer season of optimal growth and performance. It will also invest in less in the preparatory efforts that would be naturally needed in winter and which aren't now so imperative thanks to heated stables and quality rugs.

The benefits of circadian alteration have now been well proven in research and now the evidence is increasingly coming from the breeding sheds, auction rings and racetracks at the very highest level eg. to date the pioneering Equilux system has already been used by the consignors of 14 individual sales toppers selling for up to £1.6 Million and 79 G1 winners in 7 countries as well as several hundred black type performers.

To create the natural dawn and dusk the Equilux system has a dim up and dim down feature that allows the horse to experience a

gradual rising and falling of light intensity, similar to the natural environment. This feature is thought to eliminate the stress response induced by abrupt changes between light and dark in stabled horses.

Air Quality & Bio-Security

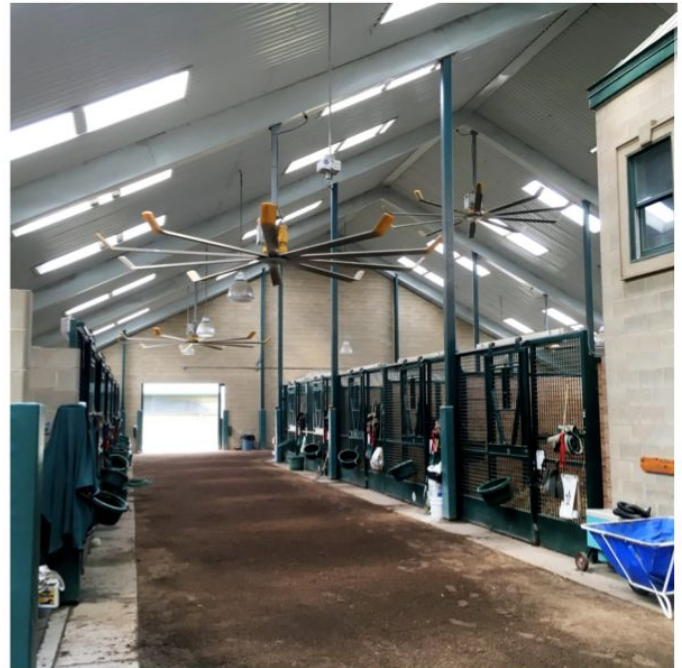
In the stable the horse is exposed to many things that wouldn't be experienced in an outdoor environment such as ammonia, dust and fungal spores that can be detrimental to their respiratory health.

Ventilation is vitally important because stagnant air contains significantly higher levels of respiratory irritants than fresh air and it is recommended that a stable is capable of providing 8-12 changes of air per day. This figure is almost impossible to achieve without mechanical assistance particularly in single stables as opposed to barns.

The world's most advanced stables have been completely redesigned to make thorough cleaning easier and minimise areas on which birds can perch and dust can collect etc. Large rotating fans are positioned to hang above the stables to force air down and create pressure that moves air down around the horse and then out.

The Equilux performance lighting system has already been proven in published research trials to significantly reduce both surface and airborne fungal and bacterial levels and the company is now developing an affordable new ventilation system that is easy to install and can exchange the air in a stable up to 24 times per day and on demand after mucking out and evening stables. Together with the Equilux automatic fogging system this can help

maintain a high level of bio security 365 days per year automatically.



A Modern Training Barn (Winstar)

Future Vision

Respiratory health is of fundamental importance in the making of a racehorse and so it's imperative that we work to understand the role of the many locations a horse will encounter before arriving on a racecourse. There is the breeder, then the foal buyer who resells as a yearling to a breeze up consigner who then resells to a trainer, on top of this there are the various vehicles used in transportation and stables at a track.

Every person and place along the chain has a responsibility and part to play in ensuring the respiratory health and biosecurity are optimised and the stable environment is controlled from the foaling box right through to the stable used at the racetrack.

Stables need to be designed in ways that incorporate ways of controlling ammonia, fungal, dust, bacterial, humidity and dust levels. Horses can handle moderate temperature ranges but systems should be in place to avoid extremes are ever encountered.

Horses deserve a complete stable control system that can automatically maintain a healthy environment 24/7/365 with low running costs, low cost of ownership and little or no involvement required of staff or owner. In addition monitoring tech should enable us to learn best practice and understand in greater detail the effectiveness of particular cleaning products and processes and collaboratively conduct research into ways of improving the microbial environments.

Save the date and register today to join us in San Diego
on the day before the the 2024 Breeders Cup!





David Doherty,
Curator, HorseTech
Market Report

Horses have been central to transportation for a millennium and we used them to build our modern mobility infrastructure. When the internal combustion engine came in the early 1900s we're told

cars replaced horses at an unanticipated pace (a transition that took place in cities like New York in less than a decade when there was also a World War). Just a hundred years later and we're facing another transportation revolution with governments committed to making the move to Electric Vehicles in densely populated urban environments at least.

In 2022 every luxury automobile brand (a \$500Billion/year industry sector) has shared the vision for their future lies in Electrically powered Autonomously self driving Vehicles. Mercedes Benz have announced an "all electric battery" powered future for their cars and trucks with a annual R&D budget of over €5 Billion. The highly competitive industry will require rapid re-imagineering of product offerings and creative transformation of brands.

Because horses stubbornly continue to refuse to drive the HorseBox remains the world's most widely used and advanced autonomous vehicles and because of the sensitivity of elite sport horses (the world's most transported animals) to electromagnetism they provide the ultimate development environment for the auto industry as it seeks to shift to electric power and the assurances & benefits it needs to provide to passengers.

Autonomous vehicles create a whole new market for environmental & health monitoring and optimisation technologies and these can be sensed if you try to imagine the challenge an automobile manufacturer faces in trying to

TRANSPORTATION

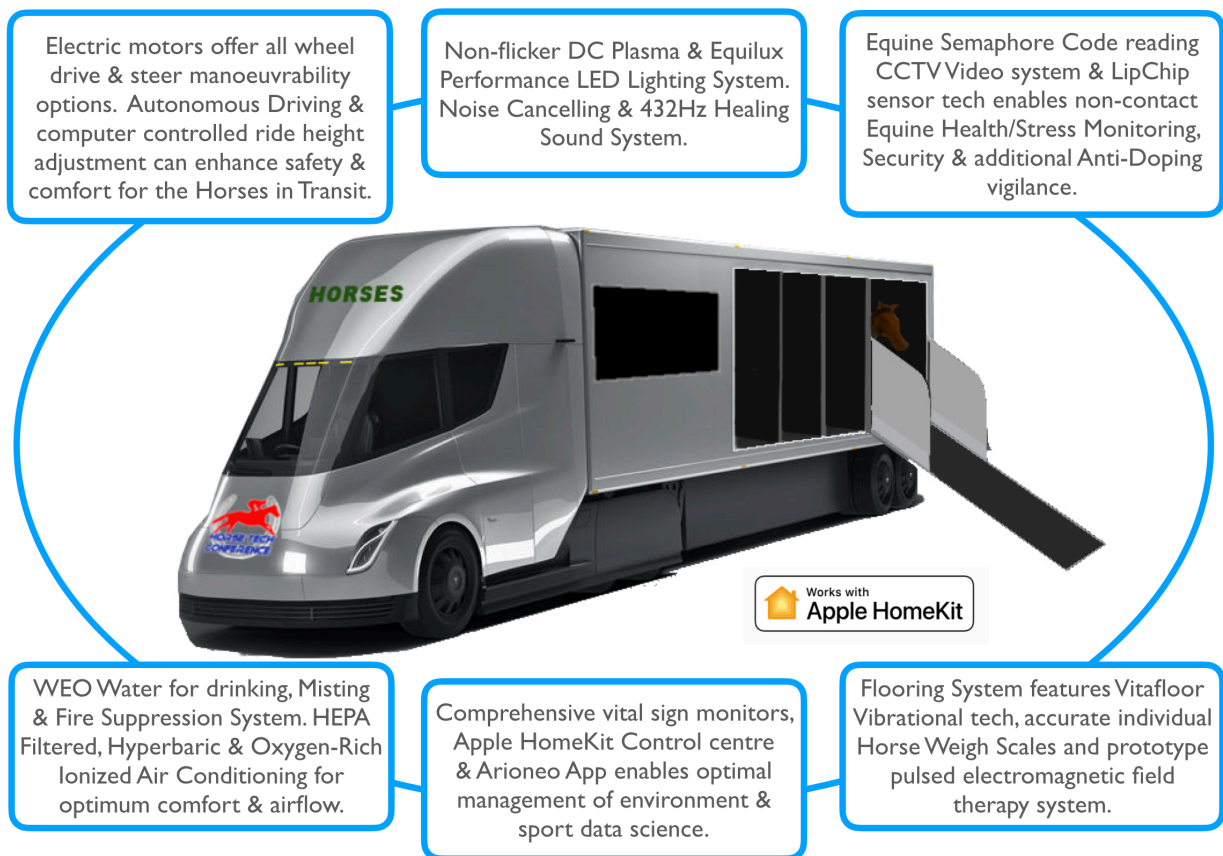
build for a future where customers who previously enjoyed driving the product they sold are now increasingly expecting to be able to get into self driven vehicles that are hired for the purposes of rest, work and entertainment while being transported.



Asset utilisation: Buy or Rent?

The significant capital required to buy and maintain a Horsebox is a challenge faced by nearly every Equestrian. Most invest in towable trailers as a compromise from a custom built horsebox but technological innovations from world leading French manufacturer Theault are creating very attractive new options. Their Renteo service enables customers to earn money from their horse box investments by hiring the vehicles to others when they're not using it. For those who don't have the need to own their own Horsebox the now can rent the latest professional equipment when and where they need it all for a cost that's substantially less than the cost to buy and maintain a trailer.

The manufacturer has invested in Smartphone apps and servers to manage the process for customers and it's transformed the experience and provides warranty cover and dealer networks to cover all eventualities and the service is already light years ahead of the automobile rental industry in terms of design



and meeting complex customer needs. Visit renteo.com for more info.

Major Challenges in Equine Transportation

Transportation environmental conditions present a very complex set of challenges due to the confinement, low predictability, motion and acoustic/vibrational stimuli. HorseBox designers must balance complex safety requirements while helping to optimise the unfamiliar claustrophobic environment so that horses can associate their times being transported as a positive experience.

By engaging with automobile brands who want to research and develop the autonomous electric vehicles that people in the future will want to travel in it's likely that Health optimisation technologies will provide significant competitive advantage as transportation is typically used most right before competition.

Many of the technologies discussed in this report might have their most obvious best use case being deployed in a Horsebox.]

Future

We're currently working on a "Tesla HorseBox" concept that combines a lot of the technologies you can read about in the HorseTech Market Report. The vision sees the vehicle being how Mercedes Benz would take a HorseFirst approach to developing the technology for their 2035 flagship S-Class model. By 2035 industry analysts predict that even mobile phone brands like Apple will be very active in the Automobile industry so the project has gained most interest so far from outside of the Equine Industry. Please get in touch if you've ideas or would like to be involved in this project.

Beyond automobiles the autonomous vehicle industry will be able to benefit considerably from innovations pioneered in Horse transport in the next few years particularly the health monitoring and management technologies eg. flying drone ambulances that might also find a role at Racetracks to transport injured jockeys to hospital etc.

For more info or to share ideas and/or get involved in the HorseTech Horsebox research project please contact David@HorseTechConference.com



*John Ormonde, Founder, John Ormonde Wexford Sand
(Pictured at the New Curragh installing six miles of state of the art all weather gallops).*

Equestrian arena surfaces are a significant investment for private horse owners, riding clubs and stable owners and when elite performance is being sought there are high expectations and demands that need to be met. To get the best results scientific studies on the link between surface properties and orthopaedic injuries need to be coupled with extensive training and experience in agriculture, civil engineering, land drainage, environmental protection and project management.

Anyone can supply you with a surface but it's a major investment and nothing comes close to value you get from working with suppliers who have experience working with the leading established trainers so be careful to reference check with a suppliers clients because it's incredibly expensive if you don't get it right. At John Ormonde Wexford Sand we supply our Equestrian Construction services to established trainers like Jim Draper, Colin Bowe Racing, Ger O' Neill, Greg Broderick, Michael Halford Racing, Noel Meath and

Jessica Harrington in the national hunt, sports and flat horse markets and are only too happy to connect new customers with existing customers who have expressed satisfaction.

Sand

Equestrian surfaces greatly benefit from having the correct size, hardness and sub-angular grains. Research conducted by Maren Stavermann PhD and Elin Hernlund DVM at the Racing Surfaces Testing Laboratory in 2007 purports that 'many well respected arenas use a high amount of sub-rounded silica sand (up to 98%) which is very consistent in size. This is then mixed with fibre to produce a surface with adequate shear strength and a low risk of compaction.' It's imperative to choose the 'right' sand for your arena. 'Wexford Sand' is a sand that is preferentially selected by top trainers, riders and racecourses because it is a very pure, fine sand with particles between #60 sieve and #200 sieve (or '60/200'). Silica sand has sub- angular sub rounded particles and is

highly desirable for use with textile footing additives, like Equeturf footing. Sub-angular sub-rounded grains lessen compaction while still giving traction, which is what makes genuine 'Wexford Sand' so popular. Because there are so many different types of sand with very different compositions and variabilities it's sensible to work with suppliers who are exclusively using the best natural sand source in your region, eg. at John Ormond Wexford Sand we exclusively use Wexford Sand because it's the best sand in Ireland.

Always seek to work with manufacturers that you are confident have a love for the sport because only these will be making the major commitments to research and capturing the value of close relationships with other clients who are innovating with new products to improve performance, consistency and safety in different disciplines.

Fibres

To ensure we had the right fibre product for a gallop or arena for all disciplines at all levels we developed the innovative Equeturf line of products and the market quickly become saturated with similar looking products that compete by being substantially cheaper but it's really important to work with a supplier who has a reputation they need to maintain because it's very easy to make profits if you are prepared to skip on quality eg. we would never use material from recycled felt that was reclaimed from previously laid flooring.

Equeturf Poly Pro: is a product designed to ensure better moisture retention and rebound. It is a special robust mix of high quality polypropylene, polyester and nylon fibres. It's sourced in a fully traceable, post-industrial

product that's free from contamination, glue and mould.

Equeturf Poly Chop: is the highest quality, heavy duty synthetic felt that we could source and it provides increased cushioning and support without becoming too firm. By working to trap moisture it reduces dust and prevents your riding surface drying out and becoming too loose. This is our best-selling additive and is often used with our Equeturf Poly Pro and Equeturf Hair Fibre to increase firmness.



Equeturf Hair Fibre: is a high quality synthetic additive that is very fine and chopped to lengths of 40-60mm. It's used to tighten up surfaces and provide a firmer, stiffer top. Hair Fibre is an excellent binder for sand. It can be used on individually or in one of our pre-mixed surfaces. It provides a tight and stable structure to ride on.

Fibre & Sand Combinations

Equeturf All Sport Mix: is a fully synthetic sand and fibre arena surface designed with the medium sized yard in mind. It's an ideal surface for busy yards, competition centres and professional trainers. We use sub-angular

fine silica sand mixed with the Equeturf Poly Pro and Equeturf Poly Chop to create a stable yet cushioned ride. Easy to maintain and having an ability to withstand heavy traffic loads without tracking makes it an ideal surface for those looking for an all-day everyday professional level surface.

As an un-waxed surface it may need irrigation during dry periods, however a wax coating can be applied to the top of this surface post-installation.

Equeturf Pro Sport Mix: is a premium dry pre-mixed riding arena surface. Using a combination of our pure polyester fine Hair Fibre and our larger Poly Chop synthetic felt, this surface is designed where there are increased traffic loads. It provides the optimal surface for eventing, heavy usage training and for professional facilities. Essentially, it is a robust, low maintenance surface that has excellent rebound qualities. It uses the same high quality silica sand as all our premixed surfaces, with a greater hair fibre content to

our Equeturf All Sport Mix to further improve structure. It is also an un-waxed surface and so will need irrigation during dry spells although a wax top-coating can be applied post-installation during the life of this surface.

Equeturf Dressage Mix: is a sand, fibre and wax dressage surface. The mix creates a product with dough like consistency that remains firm and stable to allow the horse to travel over the surface rather than through it. It is the ultimate surface for those who are serious about their flatwork and need a firm, yet cushioned level dressage surface to work on. Clients tell us that it is the best surface they have ever ridden on and the horses love it. This surface is manufactured using a sub-angular super fine silica sand. The fine Equeturf Hair Fibre and Equeturf Poly Chop Fibre give the surface support and energy to improve balance and allow the hoof and foot to roll correctly.





Maxine Franklin,
AGMA Holdings

INFECTION CONTROL & BIOSECURITY

Preventing the spread of disease is every horseman's responsibility but Infection Control and Biosecurity (i.e. daily routines set up and used to prevent the introduction and spread of disease-causing organisms) may only become important to the majority during or after an outbreak. Changing the thinking and habits of every horse owner or carer in the way they view Biosecurity is crucial to Equine health as more often than not it is we humans who inadvertently carry these pathogens from place to place, animal to animal, on our hands, shoes, clothes, equipment and vehicles.

Ensuring adequate vaccination, implementing defined quarantine procedures for new arrivals or returning horses, good human & animal hygiene and routine environmental cleaning & disinfection are the horseman's insurance policy against the spread of infectious diseases. Most of it is easy to carry out, inexpensive and common sense. Designated tack & rugs, regular Cleaning & Disinfection of surfaces & equipment plus hand hygiene is a good starting point. The most common way germs are spread is via our hands so regular hand-washing is very important in helping to reduce the spread of infections amongst ourselves and our animals.

There are many equine vaccines commercially available but none can be guaranteed 100% effective as we saw earlier this year with the equine influenza outbreak. Whilst very important in disease control vaccines are not the silver bullet many assume. In fact none are currently commercially available for several major disease-causing organisms so a well planned, well executed cleaning & disinfection regime using high quality, approved products is also essential.

The survival time of a microorganism outside the host body is increased by its ability to form

protective biofilms, spores and the presence of organic soiling. Cleaning is essential prior to the application of any disinfectant as disinfectants are deactivated by organic materials. The more organic material present, the less effective the disinfectant will be and the more the requirement for a good detergent and some good old fashioned elbow grease. This pre cleaning step is a crucial part of the disinfection process as simply spraying a dirty wall, floor or piece of equipment with disinfectant isn't effective at killing those pathogens hiding within that layer of dirt, grease and slime.

Many peer reviewed studies have clearly demonstrated that the environment plays a role in the transmission of infections. Unseen pathogens such as *Aspergillus* in the stable environment can seriously affect the respiratory system of a horse and have a serious impact upon its performance. Not only does it result in direct respiratory effects it can also lead to recurring bouts of secondary infections due to associated immune suppression. Environmental surfaces and equipment are potential sources of pathogens increasing the risk of transmission between animals either through their direct contact with contaminated surfaces or by contaminating the hands of their handlers who then transfer the pathogens to other surfaces and other animals. Unless steps are taken to remove these unseen pathogens from the horses environment achieving consistency of equine performance is going to be extremely difficult.

When preparing to disinfect your stable there are several things to consider. Non-porous, smooth surfaces are the most easily cleaned and disinfected but the construction and design of many barns and stables use porous surfaces. As these can harbour pathogens consideration should be given to applying an appropriate coating to seal these. Always ensure the surfaces have been thoroughly cleaned and disinfected before sealing to

provide a smooth, waterproof surface which can then be more easily cleaned and disinfected.

In choosing your cleaning & disinfectant products consider the overall cost not merely the price of the product. Factor in the cost of labour to set up and use the product plus any equipment required and compare that to the cost of non-compliance, increased infections and potential shutdown. Strangles in particular can have the most devastating effects on horse welfare as well as causing severe disruption with the subsequent halting of animal movement for several weeks and the associated financial implications of lock down.

Selecting the correct cleaning & disinfectant products is essential for effective disinfection as is the correct application of your chosen products. Time taken in training those who will apply the products thus gaining their understanding of the importance of and adherence to the manufacturer's instructions for use is time well spent. This combination of product and good practice results in effective surface disinfection reducing the risk and spread of diseases. cleaning and disinfection are not one and the same thing they are in fact two distinct synergistic processes.

Clean!

1. Clear the stable disposing of any manure, feed, and debris.
2. Brush, scrape and clean all surfaces in buildings and equipment removing as much organic matter as possible. Ensure all light and power sources are adequately isolated & protected.
3. Thoroughly clean all surfaces by physically scrubbing and mechanically spray-washing with a good quality detergent. Detergent plus hot water is extremely useful for effective pre cleaning, getting into the corners, cracks and crevices where pathogens are likely to exist.

Hot water under pressure cleans by flushing and by hydraulic impact; it dissolves inorganic salts, emulsifies fats and washes away organic debris. BOXFRESH is a high quality pine based detergent concentrate presented in an easy to use calibrated dosing bottle. STABLECLEANSE is a ready to use pine based detergent presented in a handy, 1lt trigger spray fitted with an fully adjustable nozzle to enable you to "spot" clean those difficult areas in stables and horseboxes on a daily basis.

Rinse!

4. Once all surfaces are "visibly" clean, rinse carefully with clean water from the top downward, making sure that all traces of the detergent are rinsed away.

5. Remove excess water and allow the surfaces to dry as drying ensures that the detergent water will not dilute the disinfectant to be applied in the next step.

Disinfect!

6. Once the surfaces that you plan to disinfect are clean and dry, make up a solution of your chosen disinfectant according to the manufacturer's instructions and DEFRA recommendation. Always read the label and follow the manufacturer's instructions as regards to preparation of their product. DIS-IN-FECT is offered in an easy to dose tablet format which is easy to store and transport. There is no fear of misplacing/losing the measuring scoop nor discrepancies on quantity between users. Using the colour coded test strips ensures that the disinfectant solution is made up correctly by each user every time. It can also be used to check the activity of a DIS-IN-FECT solution being used in an equipment soak tank or foot/boot/wheel bath although it is good practice to prepare these fresh daily, check the activity regularly and replace the solution when soiled. Always have a detergent pre clean facility in each case.



AGMA STABLEMATE

EQUINE BIOSECURITY AND HYGIENE

DEFRA APPROVED
DISINFECTANT



AGMA STABLEMATE

**AGMA Limited, Gemini Works, Haltwhistle,
Northumberland, NE49 9HA. United Kingdom.
www.agma.co.uk +44 1434 320598. stablemate@agma.co.uk**

7. Once the disinfectant solution has been prepared and its concentration checked ensure that the area in which you will be working is well ventilated (open windows and doors), the surfaces have been thoroughly pre cleaned, and all excess water and detergent residue has been removed. Donning appropriate PPE as advised by the manufacturer apply the solution to surfaces using a low pressure sprayer. Starting at the back furthest corner, work your way back towards the open door spraying the disinfectant solution evenly and paying particular attention to any nooks and crannies. Surfaces should appear visibly wet. Always check the manufacturers recommended contact or dwell time and allow to dry. Do not rinse it off! Allowing the disinfectant to dry maximises the contact time of the biocide with the pathogens for an effective kill.

8. Don't forget about shovels, forks and grooming equipment. This type of equipment can be soaked for several minutes to loosen any organic material, then scrubbed clean, rinsed, dried, sprayed with disinfectant, and allowed to dry.

9. Feed and water buckets, drinkers and any equipment which comes into intimate contact with the horse should be rinsed with clean potable water after allowing the manufacturer's specified dwell time for the disinfectant.

Walls, ceilings and floors need to be physically cleaned and disinfected on a regular basis to prevent the build-up of pathogens in the indoor environment. Remember "C" comes before "D". Clean before you Disinfect because Disinfectants don't work on dirty surfaces. Similarly dipping equipment and boots in a soak bath of dirty disinfectant solution of indeterminate concentration with manure, bedding and feed floating in it is ineffectual to say the least and you are merely lulling yourself into a false sense of security. Always

use a DEFRA approved, Biocidal Product Regulation (BPR) compliant disinfectant at the manufacturer's specified concentration and contact time for routine disinfection purposes or at the DEFRA approved concentration for specific statutory Disease Orders notices as specified on the DEFRA website.

Disinfection whilst important on a routine basis, becomes paramount when dealing with an infectious horse. Choose your cleaning and disinfectant products carefully. For routine disinfection you will need to address a variety of organisms with a disinfectant like DIS-IN-FECT which possesses a broad spectrum of anti-microbial activity against bacteria, viruses, fungi and spores. The easier and safer a product is to use, the more likely we are to use it correctly and effectively. Look for good quality cleaning and disinfectant products like the STABLEMATE range designed and developed to be compatible and effective in high soil, high traffic areas. Look for products fitted with professional, variable spray trigger sprays containing ready to use solutions, liquid concentrates in accurate dosing bottles and tableted products both of which simplify dosing.

It cannot be overstated that vaccination and environmental hygiene are two critical components in a coordinated approach to infection control and disease prevention. Better management of the stable environment by regular cleaning & disinfection of surfaces significantly reduces the numbers of pathogens in the environment and helps prevent their spread. A good clean with a high quality detergent alone can remove up to 90% of pathogens present. Add in the use of an approved broad spectrum disinfectant, good ventilation, dust free bedding and an adequate forage treatment and together these steps can make a significant, long term difference to a horse's health and performance.

Whilst disinfection is effective at controlling the spread of disease, it cannot eliminate infections if carrier animals or contaminated objects are continually introduced into susceptible populations. Always ensure vaccination and worming programmes are up to date and control the movement of animals, people, their equipment and vehicles into and out of your yard. Highlight the importance of environmental, personal & hand hygiene with colleagues, visitors and service providers. Implement the use of contact precautions and quarantine procedures for new arrivals. Continuous staff education, ongoing training and the improvement of the stable environment leads to consistency of horse health resulting in less use of medication and better long term performance.

Save the date and register today to join us in San Diego
on the day before the the 2024 Breeders Cup!



FIRE SAFETY



Brad Wilson, Safety
& Tech Advisor,
EquiProtect.co.uk

As a serving Fire Fighter and Animal Rescue Specialist I've experienced every equestrian's worst imaginable nightmare. This may sound a little dramatic, however I can assure you it is not. Equestrian centres present with unique fire safety challenges and experiences with these inspired me to found EquiProtect to work with the world's leading experts in fire and forensic science, suppression and security, to create something positive from these traumatic events: a one stop portal that ensures equestrians have the latest educational information that they need to understand the challenges and implement proactive solutions that will prevent fires and protect their beloved animals in the event of an incident.

Prevention: All too often it's not until something happens that issues are addressed but there are simple steps that can be taken to improve safety and lower the risks. In the UK regulations require employers to carry out an annual Fire Risk Assessment and this is a good rule of thumb. Risk assessments are often seen as daunting tasks and thought to be complex but a basic 5 step Fire Risk Assessment is simple; identify risks, who is at risk, control the risk, record findings and review regularly. It is simply a matter of taking some time to consider all aspects of the property and using a common-sense approach. On the EquiProtect website we've posted the latest copies of these documents and helpful how to videos. Set an annual alarm in your online calendar (during your quietest time of year) and it'll help you find it easier to manage to get around to this.

Major causes: The main causes of fires are electrical and accidental. The contributing factors to electrical fires are often born out of 'the old washing machine from home which wasn't much good so was taken to the yard' mentality, poor electrical installations which go untested, dust accumulation on light fittings, vermin chewed cables and machinery and vehicles being stored with combustibles. All of which are avoidable. The burning of rubbish on site in the wrong place, discarded hot embers and hot works process going unchecked once completed are the major contributors to accidental fires.

Security: After electrical & accidental, crime related arson (criminals setting fire to buildings to destroy evidence and cover their tracks) and ex-employee retaliation are the main causes and can be very challenging to manage. Disgruntled employees know the site and how to ensure maximum disruption. This may sound a little extreme, however it does happen and with surprising regularity. Ensure that locks, combinations and access codes are changed. Ensure fuels, oils, aerosols and solvents are kept in secure, locked containers. Criminals will do whatever they can to gain entry. Consider the use of CCTV and security lighting and secure buildings as best as possible. Vehicle keys should be locked away in a separate safe place and bedding and combustible materials should be stored away from livestock to minimise fire around them.

Preparing the site: As well as signage, some thought should be given to fire extinguishers. The rural industry has not been governed as much as



the commercial world so there is not much guidance but a good rule of thumb would be a minimum of 1 water based extinguisher per 200m² for Class A fires and travel distances should not exceed 25m in any direction to a fire extinguisher, if there is one or more floors there should be a minimum of 2 fire extinguishers per floor, located at exit points. for smaller yards under 100m² one water based extinguisher would be considered enough. When you carry out a Fire Risk Assessment this should highlight your risks and outcomes to give a better understanding of the numbers of extinguishers required. There are various types of extinguishers on the market which are designed for different classes of fire eg. if you have an electrical equipment fire then a non water based extinguisher should be used such as a Carbon Dioxide or Dry Powder. Both of these have disadvantages which should be taken in to consideration, Co₂ are noisy and may spook livestock if used and Dry Powder will discharge a large cloud of fine powder which will impair visibility, the powder is also not pleasant to breathe in and it will cause coughing as well as irritation to eyes if you get caught in the cloud. It is advisable to seek the correct advice on which extinguishers should be used for which purpose. Also training on the use of the extinguishers should be given on a regular basis. I can not stress enough that only people who have been trained in the safe use of fire extinguishers should operate them in a fire situation and only then when it is safe to do so

without putting themselves in danger. Dedicated fire fighting hose reels can be a real advantage on larger yards given they are 30m long and have a range of around 6m from the nozzle. Weather should be considered when choosing fire extinguishers, if they are to be located outside there is a risk of freezing during the winter in which case additives can be used to minimise this. The best thing I can say is consult with someone on the right extinguishers for your premises once the Fire Risk Assessment has been carried out.

"What to do in the event of a fire" signs improve response times and also continuously act to remind staff to be aware and vigilant to the risks. Order plenty of good quality signs and position them at eye level inside the entrance, on the stables exterior and on nearby buildings in well lit areas. These signs must make it 100% clear exactly what needs to be done eg. sound the alarm by pressing the button, call the Fire Service at 999 and say "I have a horse stable fire at <your full address including post/zipcode>". If special directions are needed include these also. If you have a multilingual stable make sure you have instructions printed in all of the appropriate languages to ensure everything is being done to make this invaluable response happen quickly.





Dr Edward Dutton,
Intelligence
Researcher

I'm informed by friends who ride that anyone who has spent a lot of time with a horse can describe to you a time when their mouth fell open at something seemingly highly intelligent that they saw the horse do. Apparently, they'll also have developed a profound emotional connection with their horses, sometimes more powerful than their connection with many fellow humans. Every day at racetracks, spectators, with no real interest in horses other than the desire to win a bet, stand at the parade ring and realise they're looking at animals that are highly observant and can even be comically funny, staring out photographers and pulling pranks on jockeys and owners.

By the mid-nineteenth century, leading scientists, such as Charles Darwin, were becoming increasingly interested in human intelligence and, in particular, how heritable (that is 'genetic') it was. People were also becoming fascinated by the idea of animal intelligence, with the growing intelligence that many were not simply 'brute beasts, that have no understanding.' By 1904, there was so much interest in animal intelligence that the 'Beautiful Jim Key' was one of the most popular attractions at the St Louis World's Fair. This was a horse that was, supposedly, so smart that he would ring a bell to start his own show, pick out letters and numbers asked for by his trainer; add, subtract and multiply numbers (below 30), spell a name, sort mail, use a cash register, use a telephone and pick up a coin from the bottom of a glass bottle full of water by holding his breath and dunking.

Taught with the patience and kindness of "Dr" William Key (a former slave, self-trained veterinarian and a patented medicine salesman) this horse became a celebrity and

INTELLIGENCE RESEARCH

had a special railroad car built so that he could perform to sold out crowds at the best venues right across the USA. Together they got two million kids to gather to pledge never be cruel to animals. When President William McKinley saw the horse perform at an exposition in Tennessee he declared "This is the most astonishing and entertaining exhibition I have ever witnessed" and that the act was an example of what "kindness and patience" could accomplish. The horse was unlikely to be genuinely computing sums and it is more likely that he was responding to subtle cues from his trainer. But even the ability to do this would require significant learning ability. The horse was, by horse standards, extremely intelligent. It had the horse equivalent of a high IQ.



The Genius

Stereotypically, people with high IQs are nerds, as is so brilliantly portrayed in the sitcom *The Big Bang Theory*. Nerds like maths and physics. Nerds excel at IQ tests and are abysmal at sport. So, why should horse breeders be interested in IQ tests? Aren't IQ tests outdated, discredited, and able to measure little more than cultural advantage and how good you are at the tests? Even if that's not so, aren't

high IQ people either bad at sport or simply unmotivated by it? And, anyway, how could a horse even take an IQ test?

There are two reasons why breeders should be interested in intelligence. The first relates directly to horses themselves and second relates to the kind of people, who, these days, tend to be interested in researching it. Put simply: (1) Understanding the intelligence of horses better, and breeding for it, could improve the chances that horses will be successful (2) The kind of researchers who are interested in intelligence are increasingly being driven out of formal academia. These people could be lucratively deployed researching all aspects of horses, including horse intelligence and genetics, and could help to make their horse-breeding patrons very successful.

Understanding a horse's intelligence, and especially the genetics of its intelligence, could allow them to breed horses that are more likely to win races or other and other equestrian competitions. When someone is highly intelligent, we often say that they are 'quick to learn' or that they 'catch on quickly.' This is because speed of mental processing, and thus how quickly you learn, is a significant component of intelligence. Psychologists define intelligence as the ability to solve cognitive problems combined with how quickly you can solve them. The more intelligent you are then the quicker you can solve any given problem and that

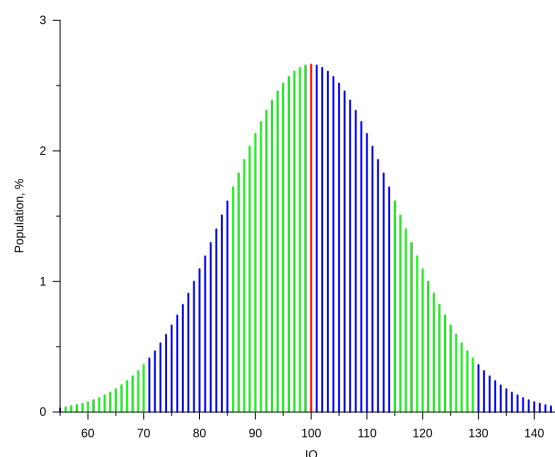


Medical sensors & ultra-high speed cameras enable horse IQs to be accurately evaluated & compared at sales etc.

harder that problem has to be before you're simply stumped and have to give up. Raw intelligence increases up to middle age, after which it declines, so we measure intelligence against people of our own age with the IQ ('Intelligence Quotient').

IQ is important in humans because it correlates with so many important and useful things including: achievement motivation, altruism, abstract thinking, health, eminence, educational accomplishment, income, socioeconomic status (both of origin and achieved), memory, motor skills, brain size, reaction times, social skills and altruism, a trusting nature, law-abidingness, having high impulse control, and future orientation. Future-orientation measures the extent to which you do not simply 'live in now.' If you tell a child he can have one marshmallow now, or two marshmallows if he waits 20 minutes then the more intelligent child generally wait the extra time. The less intelligent child cannot so easily conceive of the future, so he will be more likely to gobble up the single marshmallow immediately.

Some of these correlates stand out from the others: reaction times, brain size. Some people argue that IQ tests are highly subjective and doing well simply reflects cultural advantage: if an IQ test requires you to know the meaning of the word 'mansion,' you're more likely to know it if your parents are rich. But, if that were the only reason, IQ scores wouldn't correlate with objective measures such as these. Your reaction time is measured by how quickly you might,



INTELLIGENCE.

for example, flick a switch when a light comes on. This correlates with IQ because a big part of intelligence is simply mental processing speed. In other words, intelligent people have a higher functioning nervous system. And as for brain size, the brain is a thinking muscle so, on average, the bigger it is, the better it can think and the more intelligent its owner will be. Indeed, intelligence is also strongly genetic; overwhelmingly our IQ will be the average of our parents'

IQ, though there are always outliers due to unusual genetic combinations. Overall, intelligence is about 80% genetic, with the other 20% relating to environment. Cognitive stimulation is the key factor that pushes IQ to its so-called 'phenotypic maximum.' If you spend time with highly intelligent people having high level conversations, then there is an extent to which this will boost your IQ to its maximum possible level. The vast majority of people have an IQ of 100, with the percentage of the population getting smaller and smaller as you move away from 100 in either direction. 3.5% of the population have an IQ of over 130.

Psychologists tend to divide between three main kinds of intelligence: verbal, mathematical and spatial. People differ in how, for example, verbally or mathematically tilted their intelligence is. However, overall, people that score highly in one form of intelligence score highly in the other two. This means that we can posit a general factor of intelligence - known as *g* - which underpins

On the prairies in the Far West of America a man lost his way. He had no water to drink, although both he and his horse were parched with thirst. Not knowing where to find water, he cast the reins on the neck of his horse. By means of that wonderful intelligence which some people wrongly call instinct, the horse found his way to a spring, although it was many miles distant. Thus both man and horse were able to quench their thirst, and in this way their lives were saved.

these different forms of intelligence. The IQ test is divided into many sets of questions, known as batteries. Ability is mainly a matter of environment. Ability in others is strongly genetic. *g* is highly genetic. This means that if IQ score differences between people are on the parts of the IQ test that are the most 'g-loaded' then they are likely to be for genetic reasons.

Research on Border Collies

Intelligence is about the ability to solve problems, part of which is the ability to learn. Problem-solving tests - effectively IQ tests - have been routinely administered to various animals. We know there are individual differences in general intelligence within particular animal species and sub-species. This has been demonstrated in mice, racoons, pigeons, ravens and chimpanzees and most recently it has been comprehensively demonstrated in the breed of dog known as border collies. Psychologist Rosalind Arden, of King's College London's Institute for Psychiatry, and her team, got hold of 68 border collies in Wales aged between 1 and 12 years. This is a large number for animal studies of this kind. Testing them in a purpose-built barn, each of the border collies were given a series of problems to solve, all of

which were rewarded with a food treat. One test measured spatial intelligence (the dogs had to get a treat from behind a screen), a second measured behavioural inference (going to a beaker pointed to by a human), and the third measured

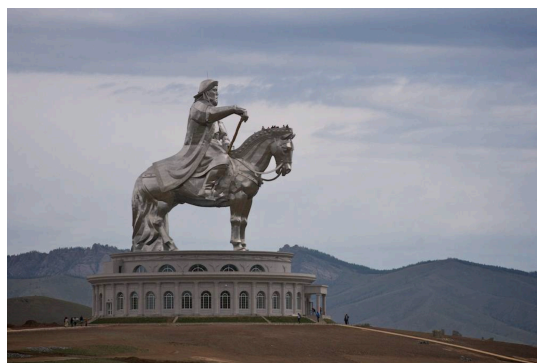


quantity discrimination (how often the dog would go to the larger of two piles of food). Arden's team found a clear g-factor among dogs. In general, those dogs which performed one of the tasks more quickly or accurately also did so in the other two tasks. This has clear implications for border collies because the more intelligent ones are kept as sheep dogs while the less intelligent ones end up being pets. But this clearly shows that there are real intelligence differences between animals of the same sub-species. This would have obvious effects in terms of survival in the wild because the more intelligent dogs would be more likely to survive and accrue territory. Related to this is secondary analysis of a study of intelligence among 99 chimpanzees.

The team that conducted the re-analysis found that the tasks administered to the chimpanzees which were the best measures of g among chimpanzees – that is those which were more g-loaded – were also more heritable, based on estimates derived from the same chimpanzees. So, the intelligence of chimpanzees – who are strongly genetically similar to us – and of dogs – who have co-evolved with us and have been bred by us – works in the same way. As with us, they have general intelligence and it is strongly genetic.

We Have Been Genetically Selected by Horses

Unlike dogs we haven't just co-evolved with horses we have been selected by them because the abilities of a horse are so intimately related to the rider. In many ways we haven't just bred horses to be more like us.



"The thoroughbred exists because its selection has depended not on experts, technicians or zoologists but on a piece of wood: the winning post of the Epsom Derby"
Federico Tesi.

They have, in a sense, selected us. Our ancestors' ability to understand and emotionally connect with horses gave them enormous advantages in terms of hunting, farming, fighting and protecting the community. It is no exaggeration to say that the tribe that had a better understanding of horses would, all else being equal, have vanquished or even wiped out the tribe against whom it

was competing for scarce resources. Our genetic lineage was decided, at many different points in history, by the cooperation between humans and emotionally intelligent horses. We are here, in part, because our ancestors knew how to train horses. Groups who didn't understand this, in Europe at least, have simply not survived. All of this means that there is almost certainly

general intelligence in horses. This is highly genetic. It will allow them to learn more efficiently, and mean that they have quicker reaction times, and it could be bred for. So, there is an obvious reason why breeders should be interested in the subject of 'intelligence.'

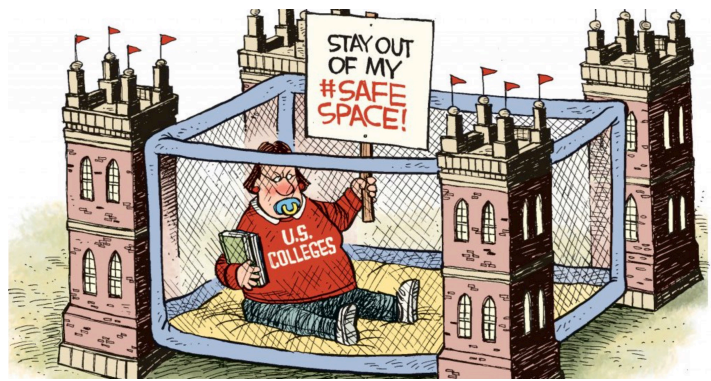
Although He Created Modern Society, It Has Rejected the Genius

But then there is a second reason, and this brings us back to the Sheldon Cooper character. Sheldon Cooper, to some extent, embodies the archetype of the scientific genius. A scientific genius is a scientist who makes major and important breakthroughs. He is, in other words, a highly creative scientist. There has been much psychological profile of these 'geniuses' or 'highly creative scientists.' In general, people who get on in life – who are

socially effective - combine intelligence with the personality traits Agreeableness (altruism and empathy) and Conscientiousness (rule-following and impulse control). These are the kinds of people who will become the 'Head Girl' of your local secondary school. They are sociable, empathetic, people-oriented, ambitious towards socially-approved goals, but highly conformist. In other words, she is not particularly creative. She may be 'artistic,' but, even as a child, she will always assiduously ensure that she colours within the lines.

The genius is very different from her. It is generally agreed that geniuses combine extremely high intelligence with moderately low agreeableness and moderately low conscientious. This means that the genius has the necessary intelligence to understand complex ideas but, being low in Conscientiousness, he can 'think outside the box' and, so, make novel connections and intuitions that the Head Girl will not make. Also, new ideas always offend against vested interests but, being moderately low in Agreeableness, he either won't care about this or won't be able to anticipate that offence would be caused even if he did care. His sole focus on the truth; on solving his given problem. It is this, and this alone, which motivates him. For this reason, many geniuses are found to be quite unworldly. They care about solving their problems, and, thus, unlike the the Head Girl, require only a minimal level of material comfort. These are the kinds of people who made the innovations behind the Industrial Revolution. These are the kinds of people who invented the Spinning Jenny, the transistor, the television and the computer.

These people are brilliant and life would be so much worse without them. But, clearly, like Sheldon Cooper, they are difficult people to be around. They are socially clumsy. They offend people. They are obsessive and they have



many autism traits (such as low empathy). Think how difficult Sheldon is to live and work with. They are attracted to problems and, being extremely open-minded (as this trait helps you solve problems), they are attracted to areas that are 'controversial' and 'fringe.' So, 'normal' people may be embarrassed by them, but they have to be tolerated, so that their genius can be nurtured. In a world in which intelligence research - which, as we've seen, is crucially important to breeders - is increasingly regarded as 'controversial' and even 'unacceptable' to certain ideologues, these are the kinds of people that will conduct the necessary research. And, as we've seen, this kind of research has huge potential for breeders.

In fact, breeders could even rescue such people from the increasingly difficult situation in which they find themselves. In order to do their genius work, geniuses, have to find themselves a job or a university place or a patron. In a less meritocratic society, this might be via family connections or informally demonstrating one's genius. In other words, the difficult short term decision to appoint, tolerate, perhaps even reward a genius instead of a conscientious and popular Head Girl type might be made by an individual who knew the nature and potential of the genius, perhaps having some genius traits himself, such as the traditional unworldly university professor.

But, nowadays, such decisions are usually made by committee vote, by officials and bureaucrats who are themselves usually the opposite of geniuses; and done according to

guidelines and protocols - 'standard procedures' and an attitude of risk-minimization will almost invariably tend to exclude geniuses, who are nearly always lopsided with weaknesses as well as strengths, and each a one-off in terms of aptitude. Who would you rather appoint as the new junior lecturer in Biology? The sparkling, socially skilled Head Girl with her perfect CV? Or the extremely intelligent but anti-social young man who might become a genius one day, but who knows? When higher education was a tiny minority sport pursued only by the highly intelligent, the genius didn't have to compete against the diligent, smiling Head Girl, but now he does.

Indeed, even if the genius can become an academic, he is confronted with serious problems. Once upon a time, he could do occasional teaching and then devote himself to his research, publishing if he discovered anything. Now, there is constant pressure to publish, publish in certain journals, attend conferences (Hellish social events for geniuses), and obtain research grants. This would drive many geniuses out of academia, leaving it dominated by the Head Girls.

Universities are Now Actively Anti-Genius

Geniuses are difficult, annoying and disruptive and this is no longer regarded to be of importance in modern British universities. In many ways the replacement religion of Political Correctness has captured the idea of 'creativity' and replaced real creativity with a fake creativity controlled by the arbiters of post-modernity: that is, mostly the mass media, which Political Correctness substantially controls. So modern 'creatives' are celebrated for their subversion of (or exposure of the supposed hypocrisy of) traditional, bourgeois and religious values; and rewarded for their celebrations of equality, pacifism, rebellion, feminism, sexual experimentation, antiracism, multiculturalism, and so on. Universities that

used to be a haven for geniuses are now little more than research factories generating 'evidence' as required by whomsoever has money enough to fund them.

In the old days, highly intelligent people were going to universities to find an escape from less intelligent people. Now people attend university because they see it as a status symbol and people with high IQs no longer have a place to belong. Mass higher education, where the majority of young people are expected to go to university, destroys universities as a haven for genius. It alters the culture of universities such they increasingly reflect the thinking of increasingly average people, with low IQ actually being weakly positively with rule-following and thus a desire for bureaucracy, group-think and many other anti-genius ways of running higher education.

The internet should have killed college, and the bubble will probably burst as employers increasingly realise that graduates have spent three years being brain washed with political correctness rather than being taught how to think by geniuses and people with some genius traits. To keep universities a haven for brilliant thinkers, it should be academically extremely difficult to attain a place in university but financially free once a student has achieved the grade required for university acceptance. Instead we now have a situation in which it is academically easy but financially difficult.

The way in which universities, in America for example, sell a young naive person on hundreds of thousands of dollars of debt for a certificate of education (for something they could have learnt off the internet and that they won't need for their job anyway) has transformed higher education. No longer are Universities about high IQ people debating opinions to get to the truth. Safe spaces and speech codes now ensure there's no chance of anyone being offended, with having your most

cherished ideas questioned being regarded as offensive. Leadership that is high in Conscientiousness and Agreeableness means you can forget about anyone doing anything original. Success is measured by how much work you get published and which journals accept you, and these journals have themselves increasingly fallen to the Politically Correct storm troopers. Because they're not easy to get along with geniuses can't understand the inconsistent speech codes and need to reject 'crime think' that permits you to be a successful academic in this Brave New World.

Geniuses, constitutionally, can't be Politically Correct. So, today they have no place in academic science. The rise of the Head Girl in universities has also led to the Feminization of universities. According to psychologist Simon Baron-Cohen, females tend to be more focused on 'empathy' than males. Males are stereotypically more focused on 'systematizing' and status-gaining competition. This difference seems to manifest in attitudes towards new and boat-rocking ideas. In a more Feminine environment, the attitude that 'It's the Truth. Incorrect ideas should be pulled apart' will succumb to 'We all need to get on. We can all have our own truths.' This is what is increasingly happening at universities. Females are also higher in Conscientiousness than males, making them more rule-following, this being another issue that the genius has problems with.

So, there is no haven for geniuses any more. But could horses be their haven or, at least, one of their havens? Geniuses love solving problems and they are attracted to 'controversial' areas such as differences in

intelligence, in evolution, in personality, to physiognomy (ascertaining psychological traits from the nature of the body) and they are extremely high in systematizing ability, in attempting to come up with theories to make sense of the world. These abilities could all be applied to better understanding the nature of horses so that those horses could ultimately generate more success for their owners. Those owners will tend to be relatively financially comfortable and the genius-type – as long as he is allowed to spend his time solving problems directly or indirectly related to his areas of interest – will require only relatively modest remuneration. And the brilliant thing about science is that, when you get to a relatively high level, you realise that all science, and thus all problems, are inter-related. So, making sense of horses means that the genius is, indirectly, moving towards solving other problems which fascinate him. So, breeders should be interested in intelligence and in those who study it.

Further Reading:

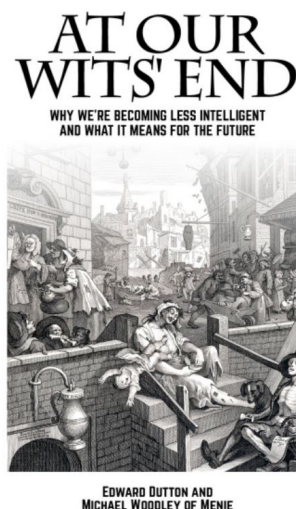
Baron-Cohen, S. (2002). *The extreme male brain theory of autism*. Trends in Cognitive Sciences 6: 248-254.

Dutton, E. & Woodley of Menie, M.A. (2018). *The Genius Famine: Why We're Becoming Less Intelligent and What It Means for the Future*. Exeter: Imprint Academic.

Dutton, E. & Charlton, B. (2015). *The Genius Famine*. Buckingham: University of Buckingham Press.

Nettle, D. (2007). *Personality: What Makes You Who You Are*. Oxford: Oxford University.

Rivas, M. (2009). *Beautiful Jim Key: The Lost History of the World's Smartest Horse*. New York: HarperCollins.





Meljay Turner,
Author,
MeljayTurner.com

EQUINE SEMAPHORE CODE

Because miscommunication is such a major challenge for anyone trying to train horses there are huge dividends for Equestrians who have better understandings of the complex language used by horses.

'The Equine Semaphore Code - the horse talks back' by dyslexic thinker Meljay Turner is the first book to detail the nature and workings of the equine language. In a highly readable, non-technical way it introduces a coding system connected with communication within the horse's ears. The work is supported by scientific research study published by Meljay as part of her BSc Equine Degree.

Cracking the Semaphore Code

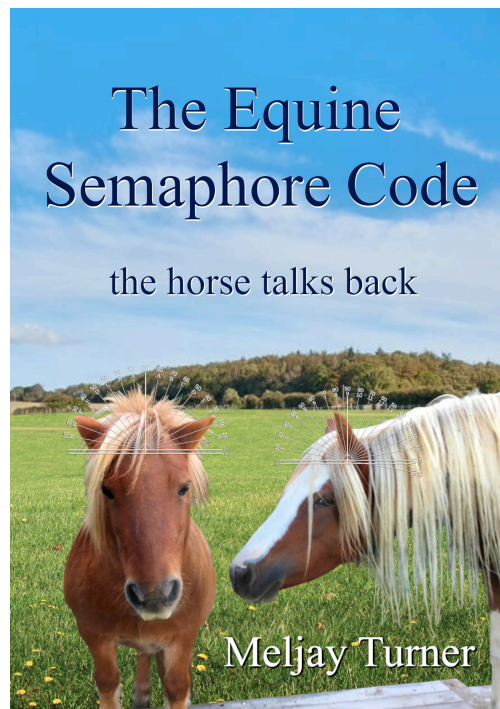
Horses, like many animals, have their own language that can have as much subtlety and complexity as the human language. The equine language utilises different parts of the body including the eyes, lips, tongue and facial expressions but the focus of the Semaphore Code is on the horses ears, an area of communication that have been overlooked scientifically in the past.

By documenting the baseline template by which a horse acts and uses its ears to communicate Meljay sought ways to share her revolutionary understanding of horses with others. The baseline that you can now learn from a book doesn't just connect the patterns in the horses ear movements and their connection to what they are saying with their

ears, but also how they use their ears to inform those around them on their intentions to change direction, stop, or move backwards etc.

Learning the Equine Semaphore Code

From studying the book Equestrians can develop invaluable new skills that will help them work better with horses. By observing the positions and actions of a horses ears an Equestrian that has learnt the baseline can quickly ascertain what a horse is saying and communicate with them.



The book normally takes about a week to read and then acts as a resource for Equestrians who wish to continue to develop their understanding of their horses language as part of the mastery of their art. In 2022 there will be audio and video versions available that will widen the reach to new audiences and make it a more practical and engaging learning experience that is also a fun way to relax after spending the day out with your horses.

4 Key HorseTech Opportunities for the Equine Semaphore Code

The incredible speed with which horses communicate have made it very challenging to study their ear movements. The availability of advanced 3D video technology has been key to expanding our knowledge and as with any new technology we're only just beginning to imagine the potential implications for the equine world from being able to better understand not just if a horse is listening, but

also what the horse is going to do next.

i) Machine Learning

Machine learning is the practice of helping software perform a task without explicit programming or rules. By annotating videos of horses communicating with the Semaphore Code we have the ability to effectively teach computers to translate what horses are saying and this opens huge opportunities for the Equestrian and for Humanity to continue learning from horses. Imagine an Apple iPhone advert in 2025: "Ever wonder what your horse is trying to say? ... there's now an app for that!"

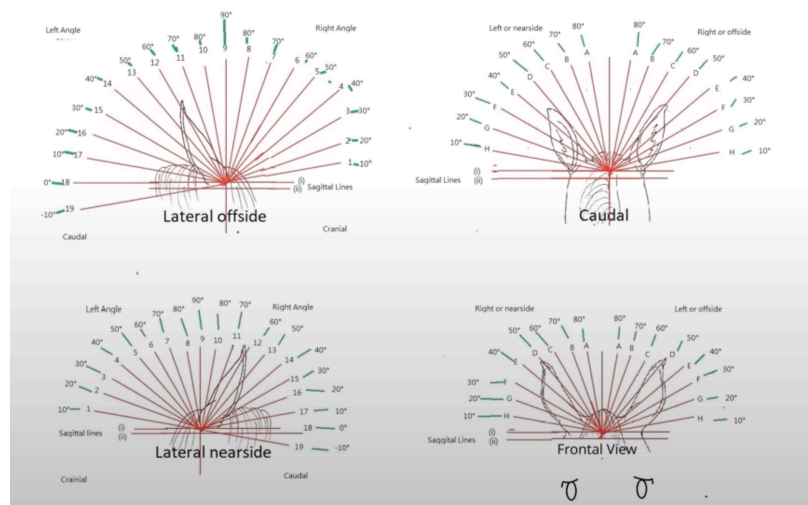
ii) Pain directed healing

Equestrians can leverage the Semaphore Code to locate sources of pain earlier and this enables us to rethink pain from being a problem into being an opportunity. In combination with transformational regenerative and energy medicine advances this is positioning the horse at the centre of the most exciting commercial opportunities of our time.

iii) Rider Training and Skills updates

Encouraging people to understand the equine language from a scientific point of view can improve both the relationships with horses and their owners and is key to improving horse and rider performance and welfare.

The Semaphore Code transcription software would enable High Definition High Frame Per Second Video to support a wide range of innovations eg. Accident Investigations, Steward Investigations, etc. Imagine a future where Racehorse Jockeys could be automatically provided with a personalised



video analysis of their performance with actionable advice after every race?

iv) Tapping into Equine Creativity

The scope of this is only limited by our imaginations. Imagine perfectly earthed horses helping to compose music or providing fundamental insights into our built and energetic environments that we can use to optimise them?

Future

This first book documents the importance of having a measurable baseline to accurately decipher and help us understand the equine language and the language processes of all animals with upright ears.

Horses have always enabled mankind to achieve the unimaginable and we can see that in the advanced civilisations that Equestrians built. If you can imagine the new possibilities that can be unlocked by advancing our understanding of what Horses think and desire you're someone that should be at the next HorseTech Conference in the USA where Meljay Turner will run a Semaphore Code Masterclass (you can also join this via the free livestream).



Daniel Ferland,
Founder, Ossicles

Horses function from instinct. In addition to their heightened senses of sight, hearing and smell, they sense what is all around them. It is as if they have radar at the edges of their field. Sound perception is one of the most acute tool in their defence system.

Becoming intimately aware of the acoustic environment that your horse exists within can prove to be a great exercise for the equestrian and can prove to be a very effective way to eliminate issues that can be adversely affecting a horse's health. Sounds that we're incapable of detecting or simply unaware of could for example be preventing your horse from entering those all important deep sleep states.

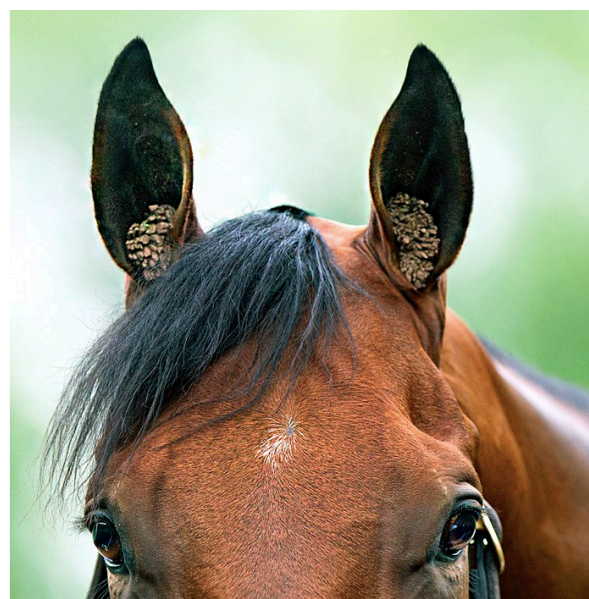
Technology offers the opportunity to not only improve our knowledge of the link between man and animal but to also enhance the connectivity we have with our horses yet the most common and only thing that most equestrians have to do with horse audiology is basic attenuation. It can make it easy to see how primitive and naive this approach is when you try and imagine how weird it would be for the human audiology market being limited to ear plugs and ear defenders.

Equine psychoacoustics is the scientific study of the psychological and physiological responses that are associated with sounds. It is an exciting growth area because it's becoming easier to deliver highly specific sounds and monitor the horse's reactions (as a proxy for how it is perceiving different sounds) using highly accurate wearable and non-invasive biosensors.

Hearing is not a purely mechanical phenomenon of wave propagation, but is also a sensory and perceptual event; in other words, when you hear something a mechanical sound wave travelling through the air is

arriving at your ear before being transformed into neural action potentials. The outer hair cells (OHC) of a mammalian cochlea give rise to an enhanced sensitivity and better frequency resolution of the mechanical response of the cochlear partition. These nerve pulses then travel to the brain where they are perceived. Hence, in many problems in acoustics, such as for audio processing, it is advantageous to take into account not just the mechanics of the environment, but also the fact that both the ear and the brain are involved in the process.

The human ear can normally hear sounds in the range 20 Hz (0.02 kHz) to 20,000 Hz (20 kHz). In contrast a horse can normally hear sounds in the range 55 Hz to 33,500 Hz. It's important to also appreciate that there may be lots of sounds that could be disturbing to your horses but are imperceptible to you. An example of this might be a distant wind turbine that can be undetectable to an equestrian but could be perceived as a roar by their horses (because their horses have more capacity to sense lower frequency sounds as these are often felt as vibrations and a horse has much greater contact with the environment than humans who wear clothes and thick soled boots).



All horses are sensitive to noise but they nearly all react in different ways. One may be afraid of a little plastic bag emitting a high frequency noise as it flutters in the wind while others will be terrified by the arrival of a low frequency engine noises emitting from an approaching tractor. Many a rider has been destabilized as a result of a noise gap or seen a horse drop a bar due to lack of focus for a mere moment. It's also important to appreciate that the selection process used to breed thoroughbreds particularly has led to some very unique diversification when compared to wild breed horses.

The horse has 10 different muscles that give it the ability to twitch its ears. These muscles are coordinated to help pinpoint the source of a sound and orientate the ear to be able to better determine where the noise is coming from and to help identify what is making the noise. The ears also have a critical role in the communication of emotions and information to other horses and this is key to their relationship with others. In the earliest domestication of horses soldiers would learn to decipher this information so that it could be used like a radar essentially providing a horseman with super-sensory eyes in the back of their heads for enemies...

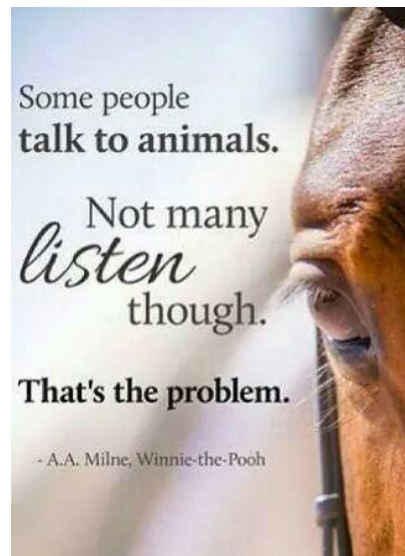
eQuiet

Most equestrian sport disciplines are involved in attenuating the hearing of the horse typically to influence certain aspects of the innate 'fear & flight' instinct of the horse. The majority of trainers and coaches use either rudimentary occlusions tools or plastic earcaps (eg. harness racing) or cloth cover (eg. jumping/hunter, thoroughbreds, etc). This is

basic equipment that covers the ears to mitigate the ambient noise that may be harmful to the concentration of the horse on his task.

While the purpose and motives for using these equipments are justifiable the means are all

too often inadequate as none of these tools actually control the horse's hearing eg, the cups only accentuate the low frequencies, the occlusion plugs attenuate sound by as little as 2-5 dB. By integrating advanced digital noise canceling technology into an earplug there is the opportunity to control the horse's hearing that opens significant opportunities to optimise the stress levels, health and performance of a horse.



Digital Sound Processing (DSP) provides the opportunity to change the nature of a stressful noise including waveform, timbre, duration, intensity and envelope characteristics. All horses are sensitive to noise but not all react in the same way. Most riders have experienced being destabilized by a horse because of a noise gap and just as one Horse may be startled by the high frequency noise created by a plastic bag fluttering in the wind another may be terrified by the arrival of a tractor emitting low frequencies or the water truck on a show ground or the ice melting down an arena roof etc, etc.

The future of intra-ear devices

For Ossicles and its partners, the contribution of new auditory technologies is an essential and invaluable asset for the control, maintenance and improvement of the health and performance of racing and competitive horses. We're excited about the multitude of

opportunities that intra-ear devices designed for horses can offer to aid efforts to monitor and better understand the health, stress control and the safety of horses.

> Transportation: horses are the animals that are transported the largest distances and journeys on trains, planes, ships and road and this can be very stressful and noisy at times. The arrival on the market of an intra-auricular noise control system is the most effective means to mitigate these stressors and to make life better for horses, while improving the health and the performance.

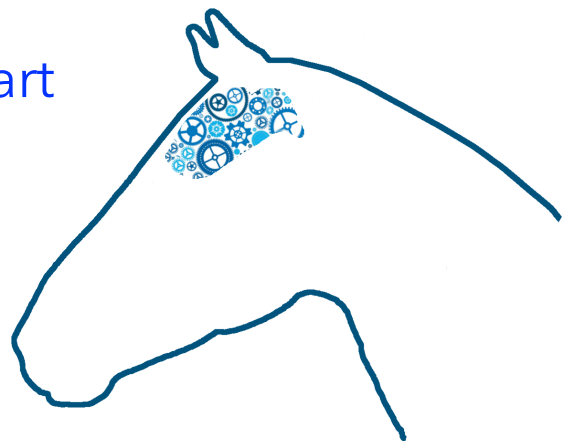
> Health: Modern technologies allow us today to obtain on our smartphone the real-time temperature, sleep state, activity, heart-rate, blood pressure and oxygen levels 24 hours a day from sensors that can be comfortably located within a horse's ear. There are enormous opportunities to expand our

knowledge of horses and the quality of our relationships with them through these always on sensory tools.

> Delivering therapy: Some fascinating work is being done using biofeedback techniques to help animals relax eg. imagine being able to play to a horse music that was timed to synch with a slowed version of their own heart rhythms to help focus it into the ideal rested state that is key to effective training and recovery. It's much more realistic and ethical to develop technologies like these for equines before humans as we're not sure of the psychological impact. Would it be incredibly addictive and cause remodelling of the brain? Would it enable tech companies to take a level of remote control of individuals that society is uncomfortable with? etc, etc.

ADVERTISEMENT

Want to know how smart
your Horses are?



David Doherty (the curator of this report) has developed a proprietary system that can quickly and accurately determine the IQ of any horse. This can be an invaluable tool when buying or selling a horse and can help give you insights into your horses and their potential futures.

The process is so quick and simple it can be conducted during a normal training day or at a sale with minimal inconvenience (most people wouldn't even notice the procedure is being done). If you'd like to know more or arrange to have horses assessed please contact David on:

Ireland +353 876 745 287. David@HorseTechConference.com

INTESTINAL MICROBIOME



Dr James Gibbons,
Head of
Microbiology,
Irish Equine Centre

Like all multicellular organisms, the horse plays host to a wide variety of microorganisms, including archaea, protists, bacteria, fungi and viruses. Collectively, the microorganisms found in a particular environment or ecological niche are referred to as the microbiota of that site. The term microbiome is used somewhat interchangeably with the term microbiota and the study of microbiomes is referred to as microbiomics. Strictly speaking, the term microbiome refers not just to the collection of organisms in a particular site but also to the genetic material of those organisms and their interactions with the environment.

Until recently, research into the microbiome of any site relied on traditional culture-based methods. While these methods have served us well, particularly in the identification of certain pathogens, the advent of culture-independent, DNA-based methods have demonstrated that there are many microorganisms which cannot be cultured in the laboratory and so their abundance, and importance, may have been underestimated previously. Using metagenomics, it is now possible to sequence the DNA present in any sample and thus identify the entirety of genes and microorganisms present in that sample. This approach has radically changed our perception of the microbial composition of various bodily sites such as the skin, respiratory tract, digestive tract and reproductive tract.

Much research has focused, not unreasonably, on the gut microbiome in both animals and humans, since the digestive tract is home to

more microorganisms than there are cells in the body. As a hindgut fermenter, the gut microbiome plays a critical role in the digestion of feed in horses and these products of digestion then act as the body's energy source. Consequently, the composition of the gut microbiome impacts on the horse's metabolism and performance. The composition of the gut microbiome varies at different sites along the digestive tract and is itself influenced by diet, age, environmental conditions and management factors. As a result of these factors and individual variation between horses it is challenging to define the 'normal' gut microbiome of the horse.

In humans, alterations in the gut microbiota have been linked to disease conditions such as



inflammatory bowel disease, asthma and diabetes, while in horses, associations between gut microbiome composition and conditions such as colic and colitis have been observed. Such associations are not necessarily causal in origin and alterations in the microbiome in diseased animals may well result from the disease process rather than causing it. The use of the microbiome data for disease diagnostics is an area of active research in human and veterinary medicine

with currently few successful commercial applications. One such commercial application in humans is the development of a non-invasive faecal-based test for the early detection of colonic polyps and colorectal cancer by the molecular diagnostics company, Metabionics. As our understanding of the workings of the microbiome increase, it is likely that further diagnostic applications will be developed.





Richard
Butterworth,
Inventor & CEO,
Equine Salt Therapy

SALT THERAPY

The most common misconceptions or myth about dry salt therapy (halotherapy) is there is no science behind it. The truth is there are more than 20 published studies in medical journals. In 1995, there was a study conducted on how halotherapy can treat children with asthma that appeared in Pediatric Pulmonology. The correlation in lung volumes in infants and small companion animals proved invaluable in determining safe effective protocols in Pet Salt Therapy. And, there have been double-blind, placebo-controlled, randomized clinical trials on the efficacy of aerosol in the treatment of sub-obstructive adenotonsillar hypertrophy and related diseases. These studies and many more are featured in the Global Wellness Institute website.

Equine salt treatment ('EST') is a natural drug-free patent protected therapeutic treatment (branded as 'Ultisalt™') that was designed following extensive research by Equine Salt Therapy Pty Ltd to treat high performance equine athletes suffering from respiratory or skin conditions. The company now operates a number of equine salt rooms for world leading thoroughbred race horse trainers and there is now a mobile salt treatment facility that is making the natural therapy available on demand to an rapidly expanding client base of Veterinarians, private-pay owners, harness racing, equestrian, quarantine stations, police, riding stables and at competitive events with whom there are increasing demands for effective non-drug treatments.

When using pharmaceutical grade mineral salt the treatment is in no way harmful to the animal and it's completely non-invasive and horses will learn to enjoy the experience. Horses are simply led into the salt treatment facility and calmed (to lower the breathing rate) where a halogenerator is used to create a specific microclimate that distributes the salt into the air as an evenly distributed fine mist that delivers a calculated dose. The room is specially designed and has sanitised walls and floors that are encrusted in mineral salts which assist



in the retention of all essential trace element vapours. The stationary horse naturally inhales and ingests the salt and the salt particles also settle on the horses' skin and coat.

The treatment is normally prescribed for 15 minutes and it is recommended to be performed over three consecutive days. Mucous levels in horse are subjectively graded by vets as being from 0 to 5, with 5 being the most severe build-up of mucous. Except in severe cases 3x 15 min daily sessions is normally enough to reduce mucous to where a vet will grade it as a 0.

It has been established that the benefits of equine salt therapy include reducing the severity of: Inflammatory Airway Disease (IAD); Exercise Induced Pulmonary Haemorrhage (EIPH); and skin lesions (e.g. boils, folliculitis, greasy heel and dermatitis). Research also shows the use of equine salt therapy reduces the need for and reliance on antibiotics and provides an easy to deliver alternative treatment to medication prescriptions that have traditionally been used to treat these conditions. Salt therapy is used by trainers as a pre-race treatment as the sodium chloride aids breathing and hydrates cells which aid the horse to perform, recover and rest better.

There are significant risks of spreading infection between different horses undergoing treatments in the same facility so world class hygiene and infection control standards have to be adopted and designed into the equipment and it's protocols for its use.

Quality engineering of the facility and the dry salt aerosol delivery system can ensure effective reliable dosing but external environmental sensors are also invaluable as variables such as altitude, humidity levels, heat and rain can all potentially compromise the dosage levels (we try to deliver at 20mg/m3) and the effectiveness of the treatment. It was no small feat to get EST delivering the same quality therapy against some incredibly varied ambient environments of our international customer base (eg. the humidity of Northern New South Wales and Queensland, the dry and high wind climates of the United Arab Emirates, the high humidity and low temperatures of Ireland, etc).

As EST therapy use expands to different breeds of horse, HorseTech innovations



(and particularly horse-side diagnostics) are having a great impact on research and helping us to better adapt for different types of horse breeds and initial mucous levels. They are also helping to extend interest to Veterinarians because they are now able to much more accurately quantify the benefits of EST in reducing healing times post-surgery and the need for antibiotics.



Replay Richard Butterworth's keynote presentation on Equine Salt Therapy from the 2017 HorseTech Conference at the Royal Veterinary College at HorseTechConference.com



ADVERTISEMENT

Want to see how your horses can benefit from Equine Salt Therapy?

Want to explore profitable Equine Salt Therapy franchise opportunities?

Contact Richard Butterworth today: ultisalt@icloud.com





Hemant Patel,
Pharmacist &
ex-President of the
Royal Pharmaceutical
Society

The Trillion Dollar pharmaceutical industry is without doubt one of the slowest monolithic industries to adapt. It currently takes over 10 years and costs more than \$2.5Billion (and sometimes up to \$12 Billion!) to bring a new drug to market. Nine out of 10 drugs entering Phase I clinical trials will never reach patients.

The pharmaceutical industry faces existential threats from technology and it's clear that the pace of innovation shows no sign of abating. To help you get a sense of how this is making an impact there are now robots available that can pick and pack more medicines in an hour than a Pharmacist could hope to process in a career and it rarely makes a mistake, needs to stop for a break or gets tired.

Future Vision

Tech and it's adoption is very unpredictable so one of the biggest challenges is imagining how the future of pharmacy will evolve and I believe that Equine Medicine provides an incredible opportunity to explore how to innovate and implement change. Imagine the following scenario: the horse's history is collected by a History Taking Questionnaire, biosensors worn by the horse upload their data continuously to the horse's cloud based Electronic Health Record and a single use push-button blood collection device painlessly draws blood on which horse-side diagnostic tests are run all before a remote Equine Vet armed with information on this particular horse and

supported by clinical decision support tools makes a video call to the owner with their horse and prescribes a medicine. The prescription is sent electronically to a central dispensary where a robot picks, labels and checks the medicine against the Horse's records for drug interactions, etc. The dispensed medicine is then packed into a shipper, loaded on to a drone and delivered to the landing spot in the Equestrian stable. Before the medicine is administered the Equestrian must follow the protocols of the medicines bespoke app and this supports follow up and ongoing medication management.

All of this may seem far-fetched, and I do not believe it is going to happen immediately, but some form of it will happen someday. Much of the technology already exists, some may need further refinement, other parts are still to be developed. We may not like it, but we have to be aware of the potential. There is a lot of potential for innovations to happen for Horses long before Humans get an equivalent service because of the huge difference in how the different markets are externally influenced by politics etc. Where is the pharmacist in all this? Will we need so many?



How much more efficiently will this enable Equine Vets to work? Where are the Pharmaceutical brands going to find themselves if a tech corporation like Amazon rolled this out?

Data Science is transforming everything and medicine is no exception. The field of regenerative medicine is full of opportunity but it's incredibly challenging to bring completely new therapies to market for Human Patients because it's so inexpensive it is up against blockbuster drug alternatives that are much more economically competitive eg. a major cancer drug can cost upwards of £100,000 per Patient and this means the marketing team behind them is going to have little/no trouble fighting off competition from a stem cell therapy that is almost inexpensive because it's made from simply running the Patient's blood through a laboratory process. Can you think of any reason why a health insurer would want people to know that the best cancer treatment costs a few hundred \$s?

Already horse-side regenerative medicine (like LipoGems) is repurposing products from the horse but imagine novel molecules to target any disease could be produced overnight to treat a specific ailment? Imagine the disruption if Equine Hospitals could leverage machine learning to accomplish what the pharmaceutical industry giants can barely do with their thousands of staff?

As the population ages (1 in 8 of the world's population will be over 65 by 2030) and "diseases of aging" like Alzheimer's will pose increasingly greater challenges to society. But

a world of pharmaceutical abundance is already emerging. As artificial intelligence converges with massive datasets in everything from gene expression to blood tests, novel drug discovery is about to get more than 100 times cheaper, faster, and more intelligently targeted.

All inefficient, slow-to-innovate, and risk-averse industries will be disrupted in the years ahead. We simply don't have time to rely on the slow,



costly production rate for new drugs. We don't have the resources to fund expensive slow delivery processes. We don't have time to rely on the poor and non-existent in market surveillance systems. We don't have time or the resources to take on the political and economic incentives in the human sickcare industry.

I think it's time we went #HorseFirst with more Pharmaceutical innovations, if you agree get in touch and let's make some plans...

Follow Hemant on Twitter [@Hemant1Patel](https://twitter.com/Hemant1Patel)

LASER THERAPY



J Mark Strong,
Director,
Global Business
Human & Veterinary
Multi Radiance
Medical

Therapeutic exposure to low levels of red and/or near infrared (NIR) light is commonly referred to as “low-level” because of its use of light at energy densities that are low compared to other forms of laser therapy that are used for ablation, cutting, and thermally coagulating tissue (Chung et al. 2011). Its popularity in veterinary medicine today continues to grow beyond its use in rehabilitation to include use as a novel and innovative means to enhance athletic performance and recovery, especially for equestrian athletes.

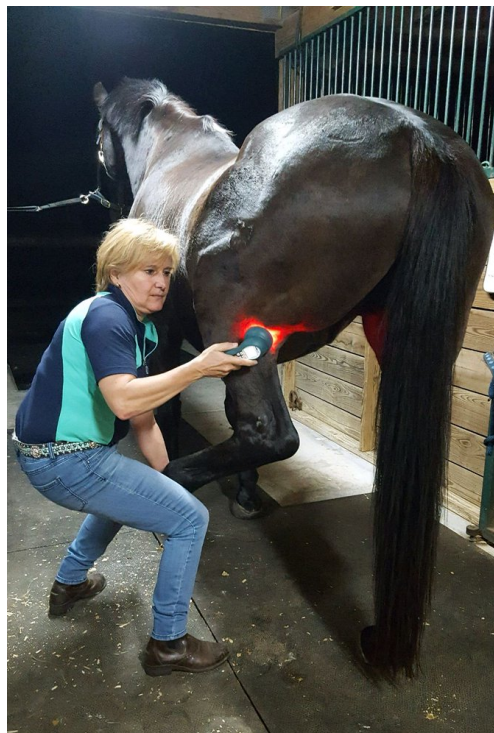
Low-level laser therapy (LLLT) is a form of medicine that applies non-thermal forms of light energy to activate beneficial therapeutic outcomes including but not limited to the alleviation of pain or inflammation, elimination of infection and promotion of wound healing. The photobiological-photochemical phenomena are similar to photosynthesis carried out by plants. To enable the visible light of low energy to affect any living biological system, the energy-carrying photons must be absorbed by electrons belonging to a photoreceptor or chromophore of the target biological system (Zilov et al. 2014). It has been theorized that the light in the red or near-infrared spectrum causes stimulation of mitochondria (Albuquerque-Pontes et al. 2015) and are thought to be a key target in the phototherapeutic mechanism of action. This stimulation leads to increased ATP production, modulation of reactive oxygen species, and

induction of transcription factors (Farivar et al. 2014). Heat becomes a compounding limitation in achieving optimal phototherapeutic effects. Most continuous wave lasers/LEDs and all high-powered Class IV lasers produce a considerable amount of unwanted heat, which can cause tissue damage. Multi Radiance identified a new semiconductor that solved this thermal overload hazard and protection expense by generating very high peak power pulses, but only for nanosecond durations.

Super Pulsed Laser (SPL) works differently than traditional high-powered lasers by producing a burst of highly focused peak power light at just billionths-of-seconds durations. The result is a low thermal influence on the skin from maximizing the optimal dose to the target, creating a beneficial phototherapeutic effect that also could transit the dermis much more efficiently to reach much deeper target tissue while cleared as a very safe Class 1, by FDA/OSHA. Non-thermal treatments are especially important when dealing with dark pigmented skin on

humans and horses. This is likewise true for darkly inked tattoos which are now very prevalent amongst athletes.

Considerable differences exist between commercially available devices. All LLLT devices must go through some form of validation, usually via scientific testing and clinical trials called a Proof of Concept (POC).



Multi Radiance embarked on the POC process in early 2013 to establish, validate and optimize the combined effect of the multi-wavelength electromagnetic energy. The experiments, trials and studies were supervised by the Laboratory of Phototherapy and Innovative Technologies in Health (LAPIT).

With the multimillion-dollar investment, the POC was able to validate the combined synergistic effects (Albuquerque-Pontes et al. 2015) of the different light sources (laser and LEDs) found in the SPL devices and identify the optimal doses and treatment parameters for the safe delivery of consistent, clinically relevant patient outcomes. The science has been used to not only optimize the parameters employed in treatment of several conditions but validate the effects in clinical trials in pain management, tissue repair, neurology and human performance enhancement. An example is the recent addition of blue light as an effective means of antimicrobial therapy against MRSA.

Some SPL research projects include pain management for different disorders such as: Fibromyalgia (Silva et al. 2018), Temporomandibular Disorder (Herpich et al. 2018), Osteoarthritis (de Paula Gomes et al. 2018), Nonspecific Knee Pain (Leal-Junior et al. 2014) and also in management of pain after total hip replacements, which can have a direct impact on decreased use of pharmacologic agents, including NSAIDs and opioids (Langella et al. 2018). Intensive research in pain management also led Multi Radiance to receiving FDA clearance for the management of neck and shoulder pain, recognizing its non-thermal mechanism of action.

SPL technology has been proven to promote ergogenic effects, improving athletic performance and accelerating post-exercise recovery. The research in this field shows that the use of SPL technology can enhance athletic performance acutely, not only in controlled

environments (Antoniali et al. 2014, Miranda et al. 2016) but also in field tests (Pinto et al. 2016) and at live events (De Marchi et al. 2019) involving high-level athletes, with results superior to other technologies including Class 3B and Class IV lasers (De Marchi et al. 2017). The technology is also able to improve athletic performance chronically when used adjunctly to strength training programs (Vanin et al.



2016) and aerobic endurance training programs (Miranda et al. 2018). These ergogenic effects can benefit not only athletes and healthy people, but also patients with pulmonary diseases such as COPD (Miranda et al. 2015, Miranda et al. 2018), and neurological episodes such as Stroke (Casalechi et al. 2018). Furthermore, outcomes from preclinical research show that it could also benefit patients with muscular dystrophies (Albuquerque-Pontes et al. 2018). More than 20 research projects are currently being conducted in different areas of health sciences.

Veterinary use of super pulsed laser therapy has grown even faster than the adoption for human applications. The abundant publication of favorable outcomes in journals, banishment of the use of high-powered lasers in public venues, and increased regulatory pressure for reducing side-effect-producing drugs continue to increase the awareness of SPL's benefits to horses and riders.

Competitive sports such as show jumping, eventing, flat racing, polo, barrel racing, cutting, reining, and roping are benefiting from the use of SPL for rehabilitating soft tissue injuries, laserpuncture and for pre-and post-event conditioning at competitions. These lasers are currently allowed for same-day use by the Federation Equestrian International (FEI).

Safety and form factor are a driving force in widespread adoption. New cordless versions recently released with much higher fluence at 50 and 200 Watts are speeding up dose delivery and permitting large areas to be treated faster. This versatility, portability, plus safety is a major purchasing incentive not only for veterinarians in busy companion animal practices, but also for veterinarians on assignment in remote locations. Super pulsed lasers are used by veterinarians at dozens of non-profits, wildlife rescues and rehab centers in remote areas such as Nepal, Bhutan, northern India and Thailand. Battery life is now 1-2 weeks between charges and the life expectancy of a laser in constant use in harsh environments is usually greater than seven years.

As the technology evolves and the science unveils other mechanisms of action and biological effects, the use of LLLT will continue to expand. New devices in novel form factors that connect to the internet of things (IOT) will emerge to address unmet medical needs and reduce undue patient burden. LLLT and SPL therapy are regarded as safe and could be performed at home when single use, pre-programmed devices are utilised.

In collaboration with the National Institute of Health (NIH), National Eye Institute (NEI), the Jaeb Center for Health Research (JCHR), Diabetic Retinopathy Clinical Research

Network (DRCE.Net), Juvenile Diabetes Research Foundation (JDRF) and Panoptik Compliance Solutions, Multi Radiance has embarked on an innovation to study and commercialize the next generation "light" wearables to address the multibillion-dollar ophthalmic market. Retilux, a prototype built and designed for the project, is being investigated for the early treatment and management of diabetic macular edema (DME). Preliminary results from smaller pilot studies are encouraging for the population of people diagnosed with diabetes. Just one percent of the market equates USD \$40M and is projected to double by the year 2030.

Super Pulsed Laser Therapy offers a safe, drug-free and side-effect-free method for pain relief, athletic performance enhancement, wound healing and other ailments, without generating unwanted heat. Its efficacy is evidenced by the plethora of completed studies and 20 clinical trials currently being performed to develop novel treatment for a variety of conditions in both human and veterinary medicine.



In 1985 I was working as a young Consultant Paediatrician when I was called to the morgue. Professor Ernesto Leal PhD (Lead Researcher) gave at the Dublin Horse Tech conference at HorseTechConference.com. I rushed down and took what had been a cold deceased newborn preterm baby and soon after I put a boy on our neonatal ward. Some weeks of care later he was well and healthy and was taken home by his mother and father. This was an example of hibernation of a new



Prof Sam Lingam,
Consultant
Paediatrician

ANTI-AGEING & LONGEVITY

born baby and it proved to me that life is not a continuum, it's no longer as simple as birth leads to death. To say that I've been fascinated by this topic ever since is a huge

understatement.

The human longevity industry pegs 'Ageing as the ultimate evil' and proposes that 'investment in Anti-Ageing technologies is the most ethical business, and to donate to longevity research is the most effective form of altruism' but with an appreciation of the need to take a 'One Health' approach to medicine it's clear this isn't true. The reality is we will understand and be able to determine the health of horses long before that of humans because we can experiment with ('move fast and break things') and undo errors (destroying human life in the event of failure is not going to be tolerated and the ethical change required if it is would require a complete revision of our civilisation).

A new word: TransEquestrianists

Transhumanism is an international intellectual movement that aims to transform the human condition by developing and making widely available sophisticated technologies to greatly enhance human intellect and physiology. It should be obvious that this will happen in Horses long BEFORE humans because they have less complex psychological needs, are owned by us so we have consent to enforce adherence to exercise/diet regimes and we can choose to destroy them humanely if we later realise we've made an error. This topic can make people nervous very quickly but to capture the pace of change in Equestrian Medicine Vs Equine Medicine think about how Genome editing is only just starting in humans (allowing us to make precise alterations to our DNA and create breakthrough treatments for debilitating conditions like cystic fibrosis etc) but in the equestrian world CrestView Genetics

have already breed a polo team of cloned horses from a tissue sample taken from a deceased champion horse.

You can read about regenerative medical tech in the chapter by Equine Veterinarian Tim Paton. It's incredible to think that a horse side procedure with local anaesthetic can provide better outcomes than orthopaedic surgery but it's also now being combined with 3D printing to enable stem cells to be printed to produce replacement organs. I'm a member of the faculty at the American Association of Anti-Ageing Medicine and as a Consultant Paediatrician it's scientifically very frustrating to notice that most human life extension efforts are being applied to Patients that are already elderly and/or in a state of disease because it's obvious to anybody that this is not where most ageing happens. As a scientist it's depressing for me to know that the outcomes and societal trust in the human longevity industry are severely hampered because nearly all the Patients are involved in it have growing deep seated personal fears of death and so they naturally are drawn to anyone who offers them the ability to pay to keep away their terrors.

With Equines there is much more impartiality and much greater transparency on cost/benefit evaluation. From my understanding in most veterinary markets where science is being applied accelerated growth (or ageing) is desirable and creates financial incentives. Equine medicine stands out because there is a high monetary and societal value, a massive demand for psychological stability and stable social dynamics and lots of interest in accurately measuring the performance of a horse which health (aka its optimised performance) makes equine medicine uniquely placed to be at the forefront of efforts to abolish ageing and replace our focus on treatment of disease with prevention of it.

Many people in the equine industry instinctively react against this because they

feel they stand to lose out and this is the inherent challenge with tech: how can an industry adopt it to its benefit. The natural self centred thinking is that if horses could live forever or even have their competing life doubled breeders would have their revenues slashed massively. Sales floors would also see greatly reduced volumes as we wouldn't need to replace so many horses so frequently. But this is not the way it has to happen.

There were people who thought TV Broadcasting of football matches would reduce the appeal for crowds filling stadiums to watch Manchester United. Similar racing enthusiasts thought the constant drive to add tech to Motorsport would take away from its appeal but today's Formula 1 is bigger than even and more about the tech gadgets and the video feeds. Automotive tech is giving us faster, bigger and more efficient vehicles and demand is only growing year on year.

HorseTech will separate winners from losers because the tech is clearly becoming mainstreamed (as evidenced by the collaborators to this HorseTech Market Report) and there are huge rewards available for anyone who finds a repeatable way of scientifically producing success. The opportunity for the equestrian lies in being associated with the upside of pioneering medical research that optimises horses and uses success to lead to transformation of human expectations of medicine.

At the HorseTech Conference at the Royal Veterinary College I discussed how optimising your own health is the key to successful innovation.

Use of therapeutic lasers in the United States began in late 2002 and has experienced explosive growth in several market segments including medical, dental and veterinary. Low-level laser or most specifically non-thermal uses of lasers were found to have profound biological effects on tissue including increased

cell proliferation, accelerating the healing process, promoting tissue regeneration, preventing cell death, analgesic action, relief of neurogenic pain (laser acupuncture), anti-inflammatory activity, etc.



Replay videos of Professor Lingam presenting at the London, Dubai and Dublin HorseTech Conferences by visiting HorseTechConference.com

Telomere Science



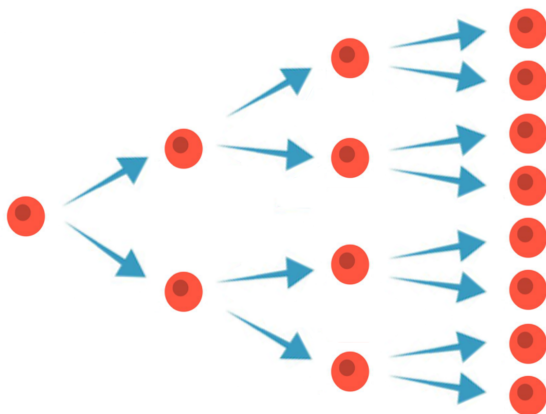
Bill Andrews, Ph.D.,
Founder & CEO
Sierra Sciences

No matter how perfect our genetics or how perfect our lifestyle our lives are still limited by a clock that ticks inside every dividing cell of our body. The same is true for dogs, cats, horses, sheep, pig, and deer. This clock

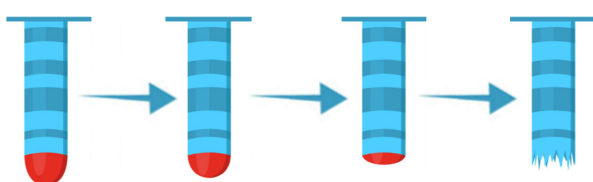
limits lifespan and is accelerated by imperfect genetics and imperfect environments, diets and lifestyles. The clock is a string of nucleotides found at the tips of our chromosomes called Telomeres.

In 1997 I discovered that the key to curing ageing lies in these double stranded DNA sequences and that they work like a book of ride tickets at an amusement park. Like ride tickets at an amusement park a specific number of beads are removed from the telomere each and every time our cells divide. When the beads are used up our cells can no longer divide or function, and we die.

As Cells Divide...



Telomeres Shorten



We are born with about 125 tickets and lose them at a rate of more than one per year. When our ride tickets are all used up we die from old age.

Most animals are similar but because Horses (particularly thoroughbreds) have reliable and extensive stud books they provide us with unique opportunities to use data science to rapidly learn more about how telomere lengths impact on an individual's health, resistance to injury, elite athleticism and breeding qualities and to pioneer new understandings of how we can breed longer telomeres (and begin breeding horses that stay young and get the opportunity to optimally develop to reach a potential that's probably unimaginable today).

As a horse owner and breeder I understand the fundamental contribution that the horse has provided as the most important animal in human history. I also understand how the limit on lifespan in horses provides an especially tough financial burden on horse owners as after a lifetime investment in training can so quickly leave them with nothing but memories if their health fails or they develop an injury due to the ageing process. I'm confident that Horses are key to curing the disease known as Ageing and seek to help educate and find research partners that would like to join us in taking a HorseFirst approach to Curing Ageing.

SHORT TELOMERES



LONG TELOMERES

The major opportunities I envision for Telomere Science to transform the Equine world include:

Telomere Measuring

Although commercial protocols exist to measure the length (ie. the number of beads) of telomeres none of them are very accurate or consistent. Sierra Sciences can offer Equestrians access to prototype Telomere measurement technologies that change this and it will transform how we work with horses. In the next few years this data will enable breakthroughs in the following areas:

> Today Equestrians simply don't know how long their horses telomeres are. They also have no real idea how rapidly their Horses telomeres are shortening nor the things that are affecting this.

> There's no real understanding of how telomere length is related to injury proneness, the recovery/healing processes and neurological development which are much more important in the Equine when compared to Human athletes because horse owners get to totally control the lives of horses from cradle to grave (and most development happens when human athletes

are children and society obviously doesn't permit experimentation on children).

> Rate with which telomeres are shortening: as we understand this more it's likely that Equestrians will quickly be able to better learn what slows or speeds up this process.

> Adoption in the elite Equine athlete market will be rapid because if you're bidding to buy a horse alongside bidders who have telomere length data you're at a serious disadvantage.

> When armed with telomere length data racehorse owners and syndicates will be well placed to work with the trainers (like Ciaran McMahon Racing) that have set up data science teams to introduce innovations that can help keep or increase the telomeres and it's easy to see how breeders that work out how to breed horses with longer telomeres will quickly dominate rivals who aren't innovating.

"in just a few years time it will be unthinkable to buy a racehorse or have a mating consultation without first having the telomeres measured"

David Doherty
Director of the HorseTech Conference

> Awareness of Telomere measuring science will become mainstream thanks to the racing industry because it's followed by the wealthiest, most senior and most numerate members of our societies. Imagine the fans watching the Japan Cup when they hear the TV

presenter comparing and contrasting not just the chronological age of the entrants but also their biological ages (thanks to telomere

analysis data published by the Japan Racing Authority).

Breeding for longer Telomeres

We all know families that age slowly but with the modern dating practices where women choose their own sexual partners we face a situation that can be highly dysgenic because it favours faster life history partners. Unfortunately sharing this information goes against the interests of lots of corporations and religious organisations. In the Equine world not only does no one care if you want to try and breed for long life expectancy but it also offers massive advantages:

> Because Horses don't forget things they learn the smartest horses are the oldest horses and so stretching the lifespan by keeping the telomeres long ensures that the product a trainer produces doesn't fail because it gets old.

> Horses that have been bred with a focus on longer telomeres will tend to lead Longer life history strategies. They'll take their time growing, reach higher levels of maturation physically and neurologically, have more potential to become dominant in a herd, etc than horses with shorter telomeres.

> Telomere length monitoring will help equestrians better understand what is causing increased rates of cell division during their horses lives, resulting in accelerated telomere shortening and early tissue failure. Because horses don't consume poisons (eg. alcohol, junk food etc) like human athletes this will help us better understand the environmental and social causes of increased rates of cell division.

> Once it is shown that a breeder can use telomere length data to breed better horses we're going see telomere data quickly become a part of a horses identity. Buyers will seek this data to be provided or will run their own test in

the same way that used automobile buyers expect a service history & mileage verification before buying.

> In the Equine world we also have the opportunity to monitor for teratogenic aspects with genetic therapies because we can so easily follow ancestors and they don't have sexual interactions with one another outside of breeding. The capability for owners of rules registered Horses to agree in advance to destroy/sterilise horses in the event that a telomere experiment is determined to be a bad idea should be the primary reason that human telomere science should be first validated in equines before being made available for humans and this could easily be leveraged by Horse Racing Authorities to grant Horse Racing it's social license eg. Instead of raising funds for cancer research etc we could encourage the public to support the racing industry as it pioneers work to cure ageing and prevent diseases like cancer.

Radically extending the Health Span of the Horse with Gene Therapy

In 1997 I became the first person to show that adding these ride tickets back to our telomeres not only stops ageing but reverses it in every way imaginable. For the scientific research that led to the discovery of an enzyme called telomerase that adds beads back to the telomeres providing additional years to healthy lifespan I was awarded the United States National Inventor of the Year. I founded the Biotech company Sierra Sciences to develop treatment regimens for administering Telomerase Therapy to humans and pets and developed a therapy that can be administered to horses in the same manner that Covid vaccines are presently administered to people. Dr. Andrews owns all the patents on this technology.

Sierra Sciences is pursuing several projects that we invite you to get involved in:

> *The development of the Equine Telomerase Reverse Transcriptase (eTERT)* which would be a genetic therapy that we expect would extend lifespan by more than 30%. The eTERT gene would be inserted into a viral vector called Adeno-Associated Virus (AAV) and then injected into the animal's blood stream where it can then infect cells throughout the body to

deliver the TERT gene to the cells. The gene then produces telomerase which lengthens the telomeres within the cells. The viral vector used is a safe virus stripped of all its disease-causing capabilities. It is left with only the ability to deliver the TERT gene to cells.

> *Immortal Horse Cloning.* This involves genetically engineering horse reproductive cells to create embryos that permanently produce telomerase. These embryos would then be cloned in surrogate brood mares who would give birth to foals that would develop into adult horses and, theoretically, never age and never have a limit on their lifespan. These characteristics would also be passed onto their offspring

> *Total RNA Sequencing.* Though many measurable biomarkers of aging already exist none can compare to obtaining a catalog of mRNA's that have increased or decreased in abundance as a result of affecting a horse's biological age. This would be true epigenetics. Sierra Sciences has designed a protocol that could create such a catalog for each horse and only requires development of a prototype to be tested.

Get involved

Telomere Science complements other disruptive technologies being pioneered in

SCAN
ME



to download the



Cure for Aging

Strategic Plan

<https://sierrasci.com/the-cure-for-aging-strategic-plan/>

the Equine world and discussed in this market report. The equine world provides a much more robust opportunity to study the science than animal research work done to date which is primarily focused on at test subject animals in laboratory environments. The rich social life provided to racehorse horses and the focus on optimisation of the

quality of their environment, nutrition, water, etc will no doubt pay great dividends for Telomere Researchers that go HorseFirst in their research focus.

Sierra Sciences is a biotech company based in Reno NV with a 10,000 sq.ft. state-of-the-art lab, with the primary mission to extend the human lifespan and healthspan through telomere maintenance. Sierra Sciences focuses exclusively on research and licenses compounds to companies that develop products and take them to market.

If you'd like to get involved with this incredible work you can learn more by downloading the Sierra Sciences Strategic Plan and/or simply connect with David Doherty today and he can register you for a video meeting with Dr Bill Andrews to discuss working with Sierra Sciences.

Text David



We're particularly interested in working with leading breeders, owners and trainers but please also get in touch if reading this chapter has given you any ideas or you've any questions or suggestions.



Prof Emmeline Hill,
Equine Geneticist &
CSO, Plusvital

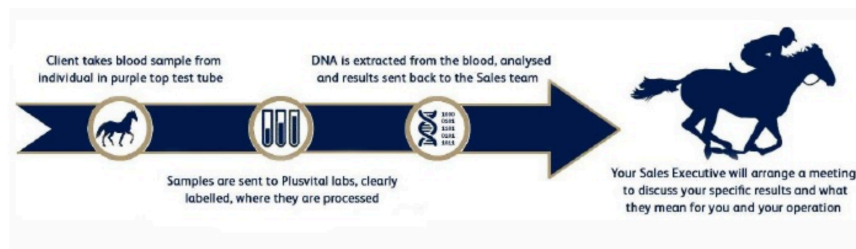
THE HORSE GENOME

For hundreds of years, breeders have relied on evaluating pedigrees, along with the conformation of a horse, to best estimate the genes that have been passed down to the individual in that pedigree to determine the likelihood of it being a champion. It's important to recognise that, for as long as thoroughbreds have been bred, genetics has been recognised as being an important part of the decision-making process and understanding of the individual.

Pedigree and genetics are attempting to identify the same thing. When someone evaluates a pedigree, they are trying to determine the various important traits that the horse has potentially inherited from its ancestors. Equine science company Plusvital are essentially doing the same thing, but can evaluate the exact DNA make-up of a horse, rather than the inferred genetic make-up that is assumed from pedigree. Pedigrees can offer a wealth of information about a horse; however there are plenty of occasions where pedigree can be misleading and this is where genetics can unlock some of the mystery. Genetics can be used to optimise a horse's opportunities, not only in breeding, but also in racing.

A lot has changed since the horse genome was sequenced eleven years ago. This has allowed equine geneticists technologies on a par with human medicine to understand the genes that contribute to traits of importance, such as those contributing to disease-predisposition and elite performance. We now have the tools that enable us to study the DNA of the horse and understand how differences in the DNA can have an effect on inherited

traits. I started research back in 2004, even before the horse genome was sequenced, to understand genes contributing to race performance traits in the thoroughbred. It was during this research that we made the discovery that we now refer to as the Speed Gene, which is that we could read the letters of a particular DNA code of a particular gene and make a prediction about how that horse is likely to perform on the racecourse. The gene in fact is the myostatin gene and it is the same gene that causes muscling in a range of mammalian species including cattle, dogs, pigs, mice, sheep and even in humans.



Plusvital Genetic Testing Process

The Speed Gene Test

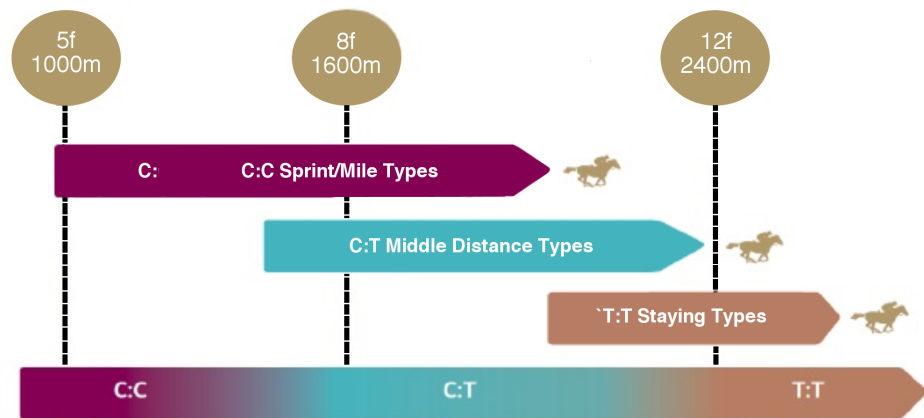
The wide-spread availability of genetic testing for the Thoroughbred only really began with the launch of the Speed Gene Test by Equinome in 2010. The associated scientific paper, also published in 2010, established the world's first direct link between an equine gene and racing performance in the Thoroughbred.

The test examines changes in the DNA within the myostatin gene, which is responsible for muscle development and muscle fibre type, and has been scientifically demonstrated by multiple research groups to have an almost singular, major influence on the distance aptitude of Thoroughbreds for racing.

In simple terms, The Speed Gene Test is designed to predict optimum race distance

Average Best Race Distance (European Black Type Only - 463 Horses)

and precocity potential with over 95% accuracy by categorising horses as one of three genetic types: C:C (suited to sprint exercise), C:T (suited to exercise requiring speed and stamina) and T:T (suited to exercise requiring stamina).



95% of horses will have their best distance within the Speed Gene Test

The implications of the benefit that this information can provide to trainers, owners and breeders is clear with the possibility to incorporate impartial, scientifically-backed information

into breeding and racing decisions. Perhaps the most high-profile example of the use of Plusvital's genetic information to date was the decision to withdraw Galileo Gold from the 2016 Derby following confirmation that he tested as a C:C sprint type. While this decision garnered widespread media attention, genetic testing for racing traits has been employed by Plusvital's clients, including leading trainers, owner and breeders in all of the major Thoroughbred regions around the world, for the last eight years.

In addition to The Speed Gene Test, Plusvital offers a range of racing performance-related tests that have been developed based on analysing the many differences in each horse's DNA that makes that individual horse unique. For example, building on results from The Speed Gene Test, the more advanced Distance Plus Test refines a horse's optimum distance range to within a couple of furlongs, while

Plusvital's Elite Performance Test examines the wide range of traits that contribute toward a horse being an elite racehorse and provides the genetic probability of that horse achieving elite racecourse and breeding success. With

well over 15,000 horses tested to-date, providing a basis for research and development, we are certainly building a solid foundation on which to base predictions.

We never recommend using genetics alone to make key decisions, however genetic information can be used in conjunction with traditional selection and training methods to improve decision-making. It is estimated that genetics is responsible for up to 40% of a horse's racetrack success, so while it is important, it never will be the only factor.

Genetics is not a silver bullet, but it is a part of the overall package. You have to start with the raw material and genetics is the raw material. How you then manage that raw material really is the key and that's where genetics plays a role alongside horsemanship and the management of the horse. The idea is that you can use this genetic information to maximise the environment for that horse to get the best out of that horse and to maximise its genetic potential.



ENERGENE-Q10: THE WORLD'S FIRST NUTRIGENOMIC SUPPLEMENT FOR HORSES BASED ON PUBLISHED SCIENTIFIC EVIDENCE

EnerGene-Q10 has been scientifically formulated to contain a highly bioavailable form of the mitochondrial Co-enzyme Q10 (CoQ10) to support more efficient energy production within a horse's muscles. The formulation also contains antioxidant properties to aid in delaying fatigue and enhancing recovery following intense exercise.

This specifically tailored supplement increases and maintains the energy levels of horses during exercise, with particular benefit for T:T type horses as categorised by our [Speed Gene Test](#).



Mike Payton,
Director,
Event Log Limited

Doping and the inappropriate use of authorised medicines are a threat to the integrity and reputation of the equestrian world. Doping creates an unfair and unsafe

competitive environment and threatens the welfare of horses. Everyone who loves horses needs to work together to ensure doping is not tolerated and should be supportive of the regulators who need to operate robust zero-tolerance systems.

At the highest level equine athletes compete for significant prizes and when you appreciate the enormity of the scale of the testing and detection processes it's key that they aren't placing too great an administrative challenge for competitors. Tech is making a massive impact in this area with significant potential for further adoption.

ANTI-DOPING

Education

Considering the number of people working in the preparation of horses for competing (e.g. stable staff, consultants, volunteers, agents, veterinary surgeons, nutritionists, etc.) an obvious route to addressing the problem of doping is to deliver training and to this end regulators are continually working to develop educational resources for industry participants as prevention is always preferable.

The British Horse Racing Authority (BHA) have produced an exhaustive Equine Anti-Doping Rules manual that's a great resource available online: <https://bit.ly/30ahL3l>

The BHA have also developed "RaceStraight" to make it easy for anyone who knows of any wrongdoing in racing to use their anonymous online reporting form or call their freephone number to report offences and help keep racing clean: <https://bit.ly/2xqhmngw>



Horse Registration

In the UK the BHA requires all GB bred horses to be registered with Weatherbys within 6 months of birth and for imported horses to be registered within three months of arrival in Great Britain accompanied by a sample that shows no evidence of anabolic steroid presence, or administration after the implementation of this policy. For more on this be sure to read the chapter on "Medical Records".

Internet Connected Horses

With trainers not only being responsible for horses when tested, but also their whereabouts information at all other times, the potential for horses to have their location and vital signs continually monitored via wearable sensors is becoming an exciting tech opportunity for trainers (check out the

Wearables chapter in this report for more info on this).

We potentially have lessons to learn from aviation style regulation, particularly in terms of realtime and retrospective data analysis supporting knowledge and fact based decision making for safety improvement.

Sample Collection, Detection & Labs

The technological challenge is obvious when you appreciate that the Racing industry prohibits the use of substances including anabolic agents, substances not approved for veterinary use, peptide hormones, growth factors, hormone and metabolic modulators, manipulation of blood and blood components, blood transfusions, genetic and cellular manipulation, oxygen carriers, sedatives, tranquilisers, hypnotics and anxiolytics (i.e. anti-anxiety agents). The testing programme



predominantly consists of urine, blood and hair and while stable-side diagnostic tech is rapidly emerging it's still the case that most samples need laboratory processing.

From registration on the General Stud Book until retirement, racehorses are subject to testing at any time regardless of location and the practical complexities of the collection of samples places a significant burden on staff and wherever tech can be used to develop efficiencies, this is of huge value to the sport. The selection of horses for testing is at the BHA's discretion and is often random or routine, but is increasingly intelligence-led.


Chain of Evidence & reliable collection are key to staying on top of the administrative challenges. Currently the BHA is implementing biometric identity systems as used in other industries like passport control to move beyond name badges and signatures.

EventLog has designed, built and deployed tech solutions to regulators and racing administrators and is promoting their tech to bloodstock auctioneers, trainers, owners, studs, vets and equine welfare bodies across the world. Notable among these projects is their work with the BHA, where they have developed a mobile app designed to allow the reading of horse microchip and sample / ID

barcode information. Since then, EventLog have developed an all encompassing app based technical solution to help BHA to be smarter, more dynamic and to take a more strategic view of their constantly evolving Anti-Doping Programme.

The Future

The reality is with high stakes and healthy competition there will always be another attempt to dope being tried by someone somewhere. The industry needs to continually strive to stay ahead and also to be mindful of not sharing processes being introduced and developed so as to stay ahead of cheats. Anti-Doping technology allows the opportunity to reduce the administrative burden on staff and increase detection and so offers a win-win in our pursuit of integrity and trust.



ANTI-DOPING TECHNOLOGY SOLUTIONS

EventLog have the skills, pedigree, know-how and capacity to design, build, deploy and support apps and web based technology solutions for a range of applications within the equine industry.

It is our goal to support the modernisation of the equine industry and to provide technology solutions to regulators and racing administrators, bloodstock auctioneers, trainers, owners, studs, vets and equine welfare bodies across the world.



Keith Johnson,
President, AmTote
International Inc

AmTote is the leading technology & services provider to the North American pari-mutuel wagering market, possessing the broadest worldwide hosts integration for

commingled pari-mutuel & fixed odds wagering systems. AmTote has aggressively evolved from its longstanding position as the preeminent totalisator company to a full racing & gaming technology, software house, product innovation, and professional services firm. In doing so, AmTote remains dedicated to facilitating the growth and success of the international racing industry for decades to come, through improving technology and developing increasingly innovative products geared toward the modern marketplace.

We're excited to have seen success with the first-of-its-kind technology we developed for horse-racing wagering terminals, from an idea conceived and proposed by the People for the Ethical Treatment of Animals (PETA) to generate ongoing income for the Thoroughbred Aftercare Alliance (TAA) to fund the invaluable services they provide for Thoroughbreds that are retired from racing.

AmTote (part of the Stronach Group which owns Santa Anita Park, Gulfstream Park, Pimlico, and other tracks) has a commitment to improving conditions for horses used in racing and so we were delighted to get the opportunity to create a new technology interface with the potential to provide millions of dollars for the care of horses beyond their racing careers and ensure that 100% of the money donated through these terminals would support Thoroughbred aftercare.

AmTote have prioritised this project to get this done because we believe in the cause and want to create sustainable positive after racing opportunities that the TAA work tirelessly to support. We're still rolling this out but so far the feedback from deployments on all the self service kiosks at Santa Anita, Saratoga Springs, GulfStream Park and Del Mar are overwhelming positive because I think it's clear to Horse Racing fans that we're all doing this for the right reasons.

Based in Lexington, Ky., the TAA accredits, inspects, and awards grants to approved aftercare

RETRAINING & AFTERCARE

organizations that retrain, retire, and re-home Thoroughbreds. Currently 64 organizations hold TAA accreditation and receive funding from the TAA in the form of annual grants earmarked for equine care.

Patron Experience

Horseplayers cashing winning tickets at Tampa Bay Downs can now share their good fortune with retired Thoroughbreds by making a tax-deductible contribution to the Thoroughbred Aftercare Alliance at self-service AmTote International betting terminals throughout the facility.

Around the kiosks we've put up some signage explaining about the collaboration with PETA and the TAA. On the kiosks themselves the operators are in complete control but they will typically play some rotating graphics about the initiative. A patron is only prompted to make a donation when they insert a winning ticket into the kiosk and that involves a terminal prompt that asks them if they'd like to make a tax-deductible contribution to the TAA - a 501(c)(3) nonprofit. Some suggested amounts are displayed to make this decision as easy as possible. The patron then collects their winnings voucher less the donated amount (100% of which goes to the TAA). The patron also receives a printed receipt detailing their charitable donation, the TAA's 501(c)(3) identification number and providing positive reinforcement for their generosity.

With little marketing and media attention so far we're seeing that 1% of patrons are making a donation on seeing the prompt and we think this is incredibly positive as it proves horseplayers are keen to support the thoroughbred athletes to have valuable second careers and dignified retirements when their racing careers have ended.

Future

We support the TAA's statement that 'aftercare cannot be an afterthought for the thoroughbred industry' and see the next phase for this is to get it accepted as just a part of how the betting industry is positively contributing to responsible after racing care and get it emulated across the world. I see hope and opportunity for it to expand to every track and to be offered when customers are collecting winnings after placing bets online or via their mobiles.





Shayne Heffernan,
Economist & Funds
Manager, HEFFX

Equestrian sports can be lucrative for the lucky few but it's an incredibly expensive business for the majority. There are a plethora of ways tech could be used to transform the experience of buying into or trading in the ownership of a horse. With a few considerations there's no reason that we won't be able to use tech to make it as easy and simple as trading in the shares of a public company.

In our opinion the fork in the road that leads to either the creation of successful teams or failed and transient owners is the creation of a knowledge base of what works and what doesn't: the combination of art and science that has given rise to organisations like Coolmore, Godolphin and Winstar. While many will dismiss those 3 by saying "well they have so much money they can buy success" that is a fallacy, take a look at the number of horses purchased with >\$1Million prices over the last 5 years by other people and you will see the vast majority of them failed.

Being in control of the process and systems from start to finish with a reference library of knowledge and best practice that is handed down and has been created and tweaked over time with a great deal of experimentation and expense makes a distinct difference in success rates. Managing the plethora of people that are involved in the life of a horse falls initially on the owner, and being a good manager is not an easy task, using the above 3 again as the example you have 2 billionaire

businessmen and a man who almost single handed transformed a nation, in short, very good managers. The key to this good management and success in our opinion is information, a flow of information between the people involved in the process and most importantly, the horse.

Technology now allows you to have a level of information not possible even 10 years ago and the amount of information continues to grow. The ability to harness and utilise this a priority in becoming a successful owner/team leader and a new segment of expansion for the thoroughbred industry.

Understanding and harnessing the value of that technology will become essential throughout the industry in the near future, the industry leaders, those we continually watch winning the classic races have already begun and their dominance can be felt now more than ever as a result, in part, of their pioneering use of technology.

Genetic, ancestral, biological, mechanical, performance and recovery sciences already exist. The challenge now is to implement, develop and master the data and of course this will be a period of experimentation and

expense, but there will be nothing more expensive than not paying attention to the technology.

Once the data is in is the rest easy? Unfortunately not the data does not take away from the age old traditions or art of horse racing, it is a new layer of insight that will need to be interpreted and actioned. Technology

Talking Horses: Redvers says racing 'may be teetering on edge of oblivion'

Bloodstock agent delivers warning that racing may be 'teetering on the edge of oblivion' through its failure to open up racehorse ownership



▲ Qatar racing manager David Redvers pictured at Newmarket.

will help deliver the horse in the best possible health and optimum fitness within the boundaries of the horseman's and the horse's ability on race day.

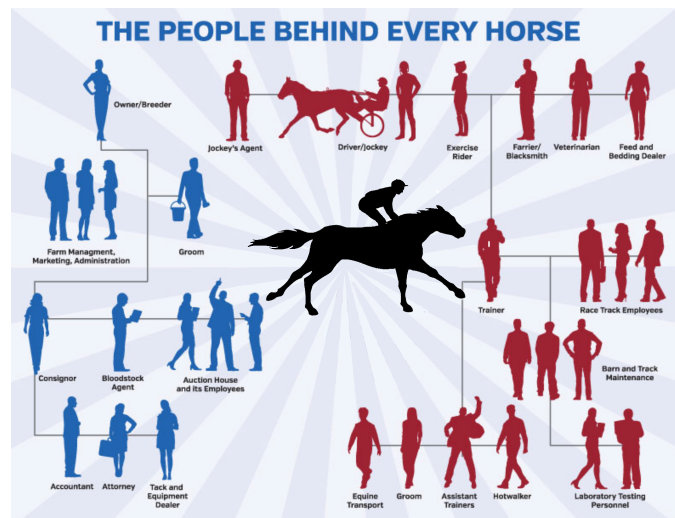
Being from the equity world I have given this a great deal of thought and the only real way to achieve such a rapid and transparent trading in the shares of a horse is to value the horse over a given period of time.

As the table here illustrates it is only when the combination of horse+time is calculated that you can accurately value a share. So if the horse is sold on day 1 there is a constant requirement for bills to be paid, the expense of administering that over a large number of changing shareholders would be prohibitive. Instead you would have to run the horse like an investment trust.

Horse plus 3 years of racing and potential aftercare bundled into a single upfront price works, the valuation of the horse share then would have a detreating time component, and asset value (prizemoney in the bank and expected resale value) and a potential earnings component, earnings would be retained and a shareholders vote taken prior to the expiration of year 3, at that point there would be a dividend, a buy out or a termination.

The legal hurdles of ownership registration would have to be addressed by the horse being owned by a corporate manager and shareholders receiving some recognition of their involvement on the corporate manager not in the horse.

This model is a process we have already partially developed using what is referred to as "smart contracts" on the blockchain network to remove the need for costly corporate fees, the NAV (Net Asset Value), the time factor and the potential earnings would all come in to play at the exchange level, they would determine price at any given point in time.



Engagement of participants will be the biggest challenge and this is where we again comeback to the "Team" idea, by bundling a group of horses into a single blockchain contract we would be able to create a team, just like Soccer, Basketball etc, part of the process and cost would be to manage and develop the team both electronically and physically by engaging individuals and giving them a true sense of belonging the way that team sports do, at this juncture Social Media will become a prime ingredient of the process.

On the compliance side the model we envisage would create a valuation on the horse within a range based on comparable sales much like in the real estate market, but still a successful team could trade above NAV based on popularity and expected future performance.

This model more closely resembles Manchester United than a traditional syndication model, Godolphin and Winstar have successfully developed a team atmosphere, China Horse Club have raised billions on a similar team mentality.

In summation it is obvious that technology is coming and it will change every aspect of the sport but the sport will remain steeped in tradition and the sport of kings.



Louisa Williams,
New Products,
Horseware Ireland

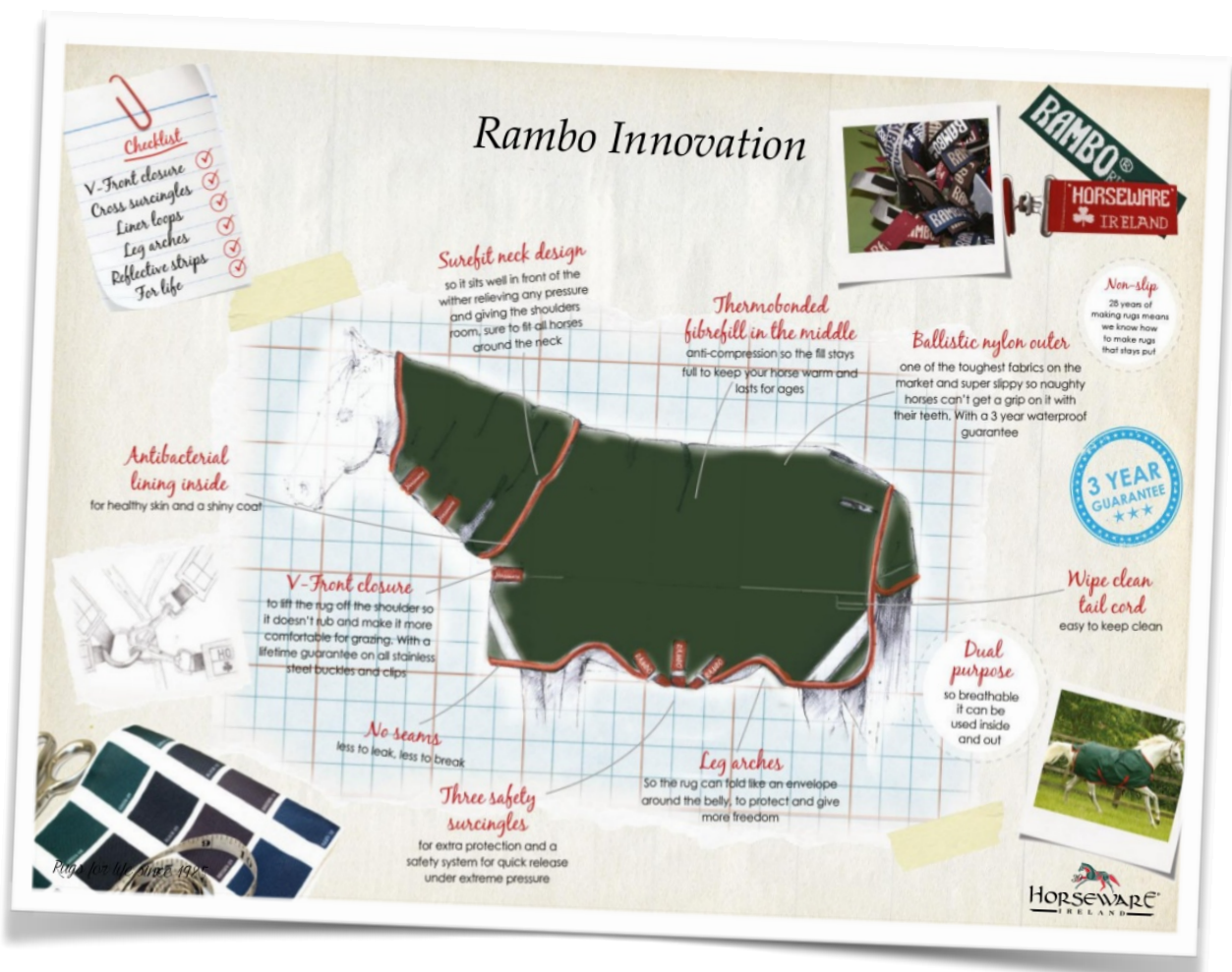
In 1985 Tom & Carol MacGuinness developed the now iconic "Rambo" rug that has set the standard for modern rug design. Made from high quality ballistic nylon this turnout rug was hard wearing, didn't slip, was breathable and waterproof. Customers loved it because it was didn't make the horse sweat, it didn't leak and they could sleep better at night because they knew their horses were protected from the elements.

Horseware has grown into a leading manufacturer of clothing for horses and riders and in 2018 we make enough rugs to cover a football pitch every single day and constantly

strives to evolve, produce the best we can and find new challenges so that we can make a difference to the lives of our customers and their horses.

In my work developing new products for Horseware I see three exciting areas where tech is making a big difference to the equine apparel market:

Apps: These are a great way to put the info equestrians need at their fingertips. With our Turnout app we've developed a range of tools including a definitive guide to keeping your horse warm and dry. The local weather feeds trigger alerts and recommendations so you don't get caught out by changes.



The app also lets you set up a profile for each of your horses containing details on their condition, whether they're clipped, age, breed, and you can use this to generate a personalised set of rugging options for your horse. Save turnouts you own to keep track of your horses wardrobe and upload an image of your horse and you can virtually try on turnouts before buying.

The ease with which you can add new features is great because our customers really know the problems, have great ideas and can share them easily with our developers through the app's feedback mechanism.

Ionic: The published evidence in the human healthcare market for magnetic therapy is quite inconsistent and one of the major reasons for that is the power of the placebo because us humans can use our brains to convince our bodies that even a completely

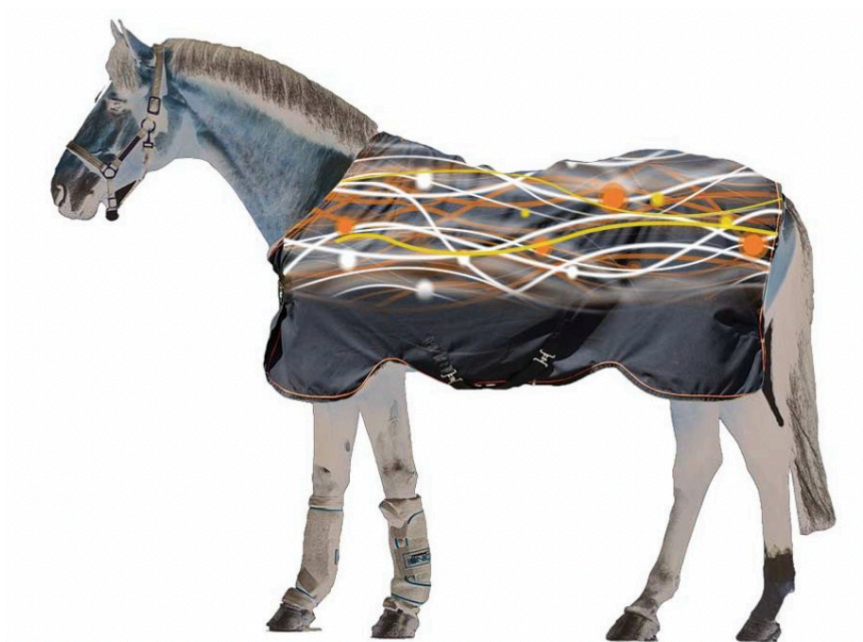


fake treatment is the real thing and measurable benefits can be experienced because the natural healing mechanisms have been initiated.

A horse doesn't know and can't see the difference between one of our comfortable lightweight rugs or one of our ionic range that contains

tourmaline (a naturally occurring crystal that when ground down to powder creates a magnetic field effect on the adjacent part of the body) but accurate biomedical sensor tech reveals that a complex biological interaction is happening that stimulates the cells in the horse in positive ways that lead to measurable positive effects including lowering blood pressure, increased circulation (detected via thermography), better breathing, etc. From our

research into this area we're uncovering that a lot of therapy products are perhaps too powerful. The horse is obviously a large strong animal but it has very sensitive skin with lots of nerve endings and we're finding stretchable materials can deliver a prolonged light action that does more to reduce muscle tension. We've already had great success with our ionic range for dogs (rugs and bed featuring the



technology) and In the next few years I definitely see us bringing the research findings into the human health market because there is a huge demand for non-drug therapies for chronic conditions like back pain.

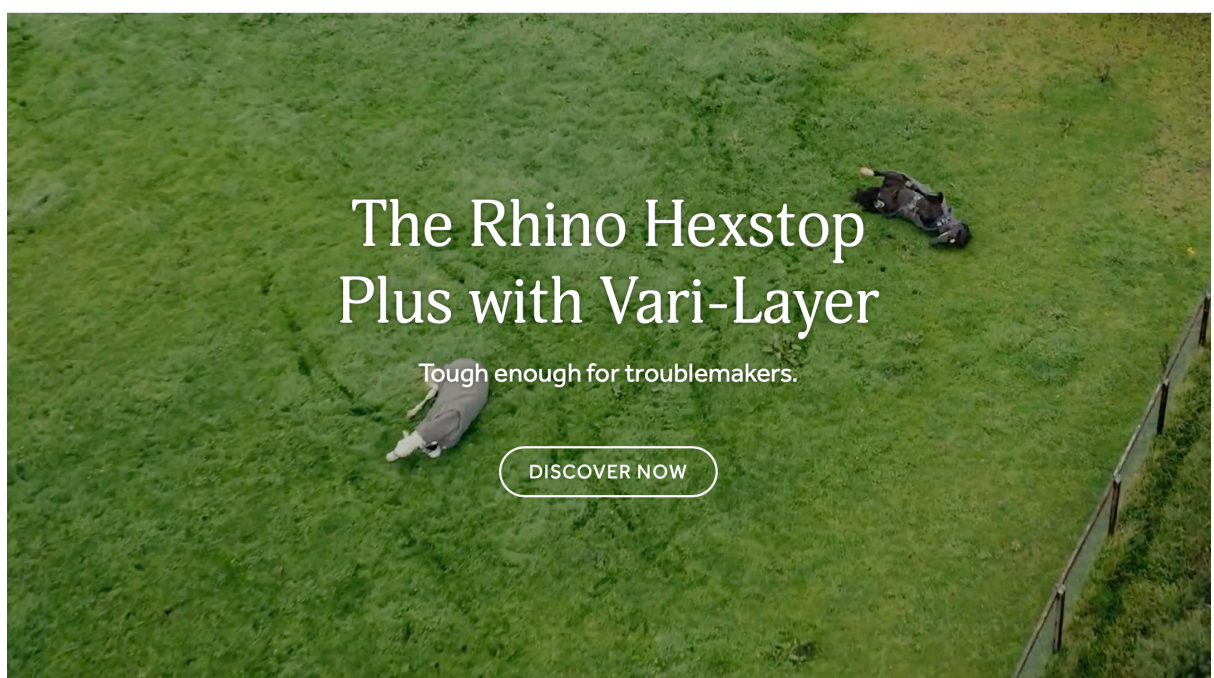
Stimulated healing therapies: "ICE-VIBE" boots are a great example of how tech can be used to deliver therapy combinations that deliver the perfect healing environment. The rechargeable batteries power a vibrating massage therapy that boosts circulation in the leg and stimulates the lymph system. The bead inserts can be frozen and inserted to help reduce inflammation, however by combining the massage and cold therapy you get the benefits of cooling but prevent the legs from getting too cold and allow circulation to help restore post-workout circulatory conditions and effectively treat strains, ligament and tendon damage.

Alternatively heated packs can be inserted into the boots to help prepare the legs for exercise while in the stable.



[HORSE](#) [THERAPIES](#) [CLOTHING](#) [PETS](#) [BLOG](#)

Search for ... 



Download the latest copy of this market report at HorseTechConference.com



Gavin Mitchell,
Managing Director,
IMV Imaging

The purchase of Imaging equipment is usually the biggest capital investment outlay that an Equine Veterinarian needs to make. At a minimum they need a good quality Ultrasound, portable Digital X-Ray and an

Endoscope in order to image the bone, soft tissue structures and airways to pick up on abnormalities and reach a diagnosis. Often we're talking about small abnormalities that can be very fine millimetre lesions.

At IMV imaging we can get a vet set up with these for an investment of around £60,000. 5 years ago the same set up would've cost £100,000 and prices will probably reduce by a further 10-15% over the next 5 years as technology and material advances continue to

make it more accessible. The push to do more and more infield imaging has led to big innovations in the development of portable imaging technology and in just the last 10 years that technology has improved ten fold so vets using the latest kit can do imaging in-field that's comparable in terms of quality to an in-hospital ultrasound scanner.

Technology is providing quicker higher quality diagnosis, saving a lot of horse travel, identifying concerns much quicker and saving owners money. In many ways the Equine Imaging market is more exciting than other imaging markets. We have even recently ultrasound scanned Manta rays in their native environment at up to 30 metres underwater - a World's first. The cost of imaging technology has fallen to a point that it is an everyday tool for equine vets and there are more obvious



applications of this technology in Equine Medicine than in the field of Human Medicine.

Here are the three areas I find most challenging and exciting in the HorseTech imaging market:

Education: We find lots of vets are scared to use the technology effectively. Very often we're really pushing technology innovations to VETS before they realise they actually need it and that's not optimal for anyone. The Veterinary Degree is increasingly less practical so it's common for qualified vets to have never touched an ultrasound scanner. Even the best technology isn't much more than just a fun toy if you haven't got the right training in place and so at IMV imaging we've made huge investments in our internationally scaled Learning Academy containing a large number of clinical resources that you can read now or download for later. You can also participate in our free veterinary courses online or attend one of our many practical hands-on training courses.

New radiation protection regulations are coming into force now in the UK and there's so much to learn to make safe controlled environments that are monitored with all personnel using protective equipment and radiation detection badges.

The Specialist fields are becoming more valuable as technology creates new possibilities. For example 4D Imaging of the heart (creating huge opportunities for Cardiologists), lameness and internal medicine specialists are getting a lot more diagnostic capability as we discover how to image parts of the horse that we just couldn't do effectively just a few years ago, standing CT is about to explode and give us diagnostic that many of us could've only dreamed of a few years ago.

Big Data: ultrasound imaging remains a dark art/science and while it's early days we're working towards end to end connected

ultrasound systems. These are enabling us to start pulling back scan information and adding breed specific information and the conditions they are imaging enable us to understand better the genetic differences between the breeds so that we can continuously develop better imaging settings and push them to vets so that we remotely set up their ultrasound system for the particular job at hand. This means the quality of the images they're able to get and the speed with which it takes them is vastly improved. Equine is a good test bed for this type of technology because this information is already being given to us so machine learning opportunities abound.



O The Easi-Scan:Go is a wireless, App based scanner, that presents the ultrasound image on up to 3 smart devices and the IMV Cloud simultaneously.



Software: More portable and powerful imaging devices are having a huge impact and the user interfaces are advancing rapidly. While touchscreen has value for equine vets (as conditions for infield imaging can involve wet hands, mud etc) voice control is much more promising. We already have systems offering voice control to enable start, increase/reduce gain and save images but this is just the beginning. When integrated with the practice management software it offers a step change in how efficiently the vet can work and of course it's always helpful to have a free hand. Further App development will also aid training, support and confidence of diagnosis.

^ IMV Imaging's learning library contains a large number of clinical resources to enhance your Veterinary knowledge, skills and gain CPD points.

Future

In 10 years' time we're going to be able to get high quality internal scans by simply getting our horses to swallow technology like the Sonopill ultrasound sensor. Scottish Universities are developing these technologies and I think it's another great example that makes sense to develop for animals before humans due to regulatory restrictions.



HOOF CARE



Fran Jurga,
Hoofcare Publishing

Shoeing horses is surely the oldest horse-related profession in the history of civilization. Long ago, humans started protecting their horses' feet with leather, straw or metal hoof protectors, such as Roman hipposandals, and, later, when blacksmiths mastered horse handling and started actually nailing iron shoes onto hooves.

Look around a farrier's forge today and you'll see that most tools and shoes have not changed significantly over the centuries. The materials are better quality and the manufacturing expertise is more skilled, but the basic tools of today look remarkably similar to the ones you see in a museum.

Looks, however, are deceiving. Beneath the quaint image of the village blacksmith runs a deep streak of centuries-old technology prowess, along with what seems to be an ingrained desire within each and every farrier to figure out how to shoe a horse better or to build a more effective horseshoe. Invention is in their DNA.

My career has been dedicated, in great part, to chronicling the breakaway efforts in recent decades to modernize farriery and improve the care given to horses' hooves. Education and professional organizations have been critical to the latter, but the former has been functioning quietly beneath the radar, with exciting experimental shoes and hoof boots developed using very modern materials and processes, but never finding widespread success in the market.

Why did the progressive, futuristic horseshoes fail? Many never enjoyed even a fleeting 15 minutes of fame because of the lack of desire on the part of most farriers to learn new skills and leave their "comfort zones" of shoeing in the traditional manner. There was also the fear



that a new shoe design would change the horse's performance ability or, even worse, injure the foot through a special trim required to make it fit. Today, however, more farriers are willing to make room in their tool boxes to include technology, and horses are the beneficiaries.

In this article, we'll look at some of the ways that technology is being used under the spreading chestnut tree where the village smithy stands -- because his smithy now has a high speed wifi network.

Lameness or comparative movement evaluations:

Farriers were once on their own to decide how to shoe a horse with an imperfect gait or conformation. Today, they may be working with veterinarians and other professionals on a pre-shoeing gait or soundness evaluation utilizing sensor-based analysis systems. The current leader in this field is custom-designed for equine foot problems: The Lameness Locator from Equinosis® (USA) relies on accelerometry and gyroscope sensors attached to the poll, pelvis and right front pastern.

Metron imaging software (USA) isn't new; it is a system long used to measure angles and points on the hoof via digital photography and radiography. Farriers often use it to document



Alternate systems evaluate the horse's weightbearing and stance using a pressure-sensitive mat (Tekscan, F-Scan, USA) or in-shoe system, which shows how and if a horse lands or bears weight differently on a lame limb or how change is affected with a change of shoe designs. The third type of system utilizes video-based motion capture ("mocap") software systems (Quintic Sports, UK) (Qualisys, Sweden), using sensors positioned on the articulation points of critical limb joints to measure stride length and joint flexion, or compare the action of paired or diagonal limbs.

their cases. However, Metron's sister company EponaShoe (USA) has a new hardware "EponaCam" component that holds a smartphone for calibrated foot photos for case records, calibrating with Metron into a seamless image capture.

Lameness diagnostics: *Once the vet/farrier team identifies a horse's movement characteristics and has collected data pinpointing potential faults, the horse transitions to the diagnostic stage, which begins with an ever-growing choice of imaging systems, from simple digital radiographs to nuclear imaging ("bone scanning") and MRI or CT. In all imaging technologies, farriers need to know how documentation of an injury or misalignment in the bony column can affect*



how a horse stands, lands, or moves, and what can be tried to improve the horse's comfort in motion.

Modeling: Imaging doesn't stop when the veterinarian leaves the farrier to shoe the horse. The farrier may need to do some further modeling, such as creating a mold of a lower limb for shoe design purposes, or taking multiple digital images and tracings of the foot before creating a special shoe, hoof cast or leg brace. Models and drawings may be transmitted to a referral specialist veterinarian or farrier at a remote location--even thousands of miles away--who will advise on diagnostics or even craft a shoe or brace for the horse.

Morphology scanning: In the most futuristic scenarios, some farriers utilize scanners that collect data points to determine the morphology of the hoof capsule and translate it into coordinates used in 3D printing, again for creating casts, braces, molds and shoes.

Case records: Another area of imaging often seen in contemporary farrier work is before-and-after videotaping of the horse walking or trotting or, increasingly, before and after digital radiography for assessing hoof balance. Farriers also use their personal smartphones to record short video bursts or still images of their work for record-keeping or consultation with vets and owners.

Horseshoe materials: When farriers select a shoe for a horse, the choices seem endless, thanks to an explosion in international markets to make horseshoes in an infinite number of

designs, and from an ever-expanding selection of materials, in a full range of sizes and at several cost points. The farrier may also be attaching more than a shoe to the hoof; cushioning or protective materials often cover the entire bottom of the foot and are integrated with the shoe, creating a "package" of support with materials of varying density or "softness".



Most horseshoes are made from low-carbon "mild" steel or aluminium alloys of various weights and durability. Plastics are a distant third in popularity. The farrier chooses a shoe based on factors such as the durability and protection the material and shape can offer

the horse, and how much weight it adds to the foot. For horses that perform precise show gaits, quality of movement, often in the lateral plane, is of supreme importance. With horses that compete over long distances or work at high speeds, weight reduction in shoe material matters greatly, but not at the sacrifice of durability and traction.

Client preferences

A farrier also must please the (human) client, who may have preferences for or prejudices against certain materials, manufacturers, or designs of shoes; client opinions may be based on lifetime experience and tradition, as much from actual trial and error to equip horses with better shoes. Many shoes of new materials, especially plastics, meet resistance from trainers and riders who do not want to risk any change in the horse's routine, even if the shoe could possibly offer a better solution for the horse.

At other times, the reverse is true: trainers and riders would like to embrace technology and try modern materials on their horses' hooves, but the farrier lacks either the skill, knowledge, or willingness to work with new materials. A considerable knowledge gap exists in the field.

Most farriers are never required to use modern materials or methods. In countries with apprentice-based education systems, this fact makes it difficult to effect a sea change in new generations of farriers, who might embrace new methods if they had been exposed to them in their training.

High-tech horseshoe materials

As in most aspects of the horse world, changes in hoofcare are best done in small increments. There have been few overnight successes, but each new-design horseshoe's success opens a door for the next. Here are some success stories that have shown that new materials can work on the bottom of a horse's foot. These products have utilized both new materials for protecting the foot itself as well as methods of attachment. Also, most of these shoes have intensive customer education support systems and participate publicly in trade shows and workshops.

It is best to preface this section with a word about adhesive technology, which at first seems to have nothing to do with horses. Some people will laugh, and remember that glue was once made from rendering horse hooves, and the idea that glue is now being applied to the outside of horses' feet may seem ironic.

But today's glues have



more in common with space technology or aircraft manufacture than with old-fashioned rendering-plant glue. Since back in the 1800s, scientific papers have been published promoting nail-free horseshoes and glued-on shoes but the adhesives were presumably not capable of carrying the weight of shoes in use at that time.

Imprint horseshoes

Imprint horseshoes (UK) are an example of a unique material--moldable thermoplastic--used in a highly effective application for custom fitting a variety of glue-on shoe designs for foal deformities, lameness therapy and sport horse performance.

Sigafoos shoes

In the 1960s, the first papers on research into horseshoe adhesives were published by veterinarians at the University of Pennsylvania in the United States. Working with Dow Chemical, they sought to utilize epoxies to attach horseshoes, and achieved some success. Years later, in the 1980s, the university's farrier, Rob Sigafoos, mastered the adhesion of shoes and the repair of hoof wall injuries with the use of synthetic polymethyl methacrylate

(PMMA) adhesive. His line of "Sigafoos shoes" (USA) is still an industry leader around the world, and still uses PMMA adhesive. What has changed is a rising tide of skilled farriers who have both perfected use of the adhesive and found innovative ways to use it, both with the Sigafoos shoes and even to the "direct glue" of raceplates on horses.



Polyflex shoes

The quest to find an improvement for shoeing racehorses led American farrier Curtis Burns to create polyurethane shoes based on pouring liquid into moulds over a metal spine, which allows the shoe to be shaped. His "Polyflex" (USA) shoes have been worn by winners of Breeders Cup and Triple Crown races in the United States and are exported worldwide. Recent advances for Polyflex have focused on three-dimensional adhesive horseshoes incorporating a hoof wall cuff for correct of limb deformities in foals. Burns employs 3D printers to create prototypes of shoes for mould construction.

Formahoof

FormaHoof is the world's first and only liquid-fit mold-on "horseshoe". To apply the "shoe" the hoof is placed in a flexible mold with a mesh that will support wear and tear. The liquid FormaHoof advanced polymer is injected into holes in the mold, to encompass the mesh and form a protective layer in a 3D structure around the hoof that flexes as a healthy barefoot would. One of the main benefits of using the FormaHoof "mold-on" process is the increased repeatability, eliminating to a large extent human related errors and ensuring the geometry of the perfect healthy hoof is always created.

The product was first developed by the collaboration of experts from two sectors; the equine sector, (a world class trainer, equine podiatrists, vets, farriers and jockeys), who came together with a team of experts using latest 3D technologies, (3D computer aided design, 3D scanning and 3D printing), more frequently employed by the aerospace and defence, and automotive sectors. It was only with the combined knowledge that was applied in product development that managed to create a real innovation and leap forward in hoof care. A large component of the design philosophy that created FormaHoof was to work from the ground to create a solution that will solve real problems associated with using current hoof care products on the market. To this extent - a completely new process of liquid-fit shoeing was created, moving away from traditional solutions and their inherent problems.

Due to the unique 3D mechanical support of the finalised FormaHoof application, it lends itself perfectly to the rehabilitation of some of the most prevalent hoof ailments, such as: Laminitis/Founder, White Line Disease, Navicular Disease, hoof cracks and many more.

The resulting application has been demonstrated to offer the immediate benefits of an instant reduction in pain and a considerable increase in movement capability,



in turn resulting in increased blood flow and accelerated recovery. The product is not only suitable for rehab, with many hoof experts choosing to apply it as a day-to-day hoof protection solution – especially if operating in challenging environments (mud, sand, sharp rock or slippery surfaces).

Removable horseshoes

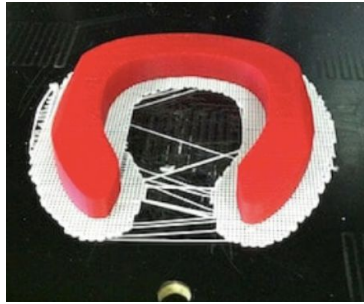
The popularity of new designs of sophisticated removable hoof boots has resulted in a steady stream of innovations in weight, material and attachment of boots that encompass all or most of the foot, while attaching either with adhesive or some sort of collar around the pastern. EasyCare (USA) has pushed innovation on multiple levels in the farrier industry by developing multiple designs of full and adhesive boots, adhesive-tabbed shoes, and flat glue/nail hybrid shoes from plastics.

An idea whose time has come is that horseshoes should be affixed to the foot only when needed. An idea from Europe still in the startup phase requires what look like velcro patches adhered to the hoof wall; GoodSmith (Germany), Megabus (Austria) and P&P Esprit (Austria) are three shoes with tabs that adhere to glued-on hoof wall patches by Velcro hook-and-loop closure.

If the removable horseshoe idea catches on, horseshoes may transit from semi-permanent management to an accessory added to the tacking up procedure.

3D printing of horseshoes

In 2016, an experiment in Australia set out to 3D print titanium horseshoes. While the project's technology hasn't trickled down to farriers in the field, the use of 3D printing is



common among horseshoe and tool manufacturers in the research and development stage. Making prostheses for amputee horses also has employed 3D print technology.

The accuracy of horseshoe shaping and precise fit are critical to the optimal function of any shoeing prescription. Leaders in this area are the inventors behind Valuefeet shoes (France), who plan to equip farriers with a patented optical-thermographic scanner and software for a pre-shoeing evaluation. The shoes are then custom-manufactured by Valuefeet, including clips, stud holes and coatings, and shipped to the farrier for installation.

In addition to advances in adhesive to attach shoes, casting tape has been used successfully as a hoof covering, often covering the shoe and most of the hoof itself, particularly on feet with cracks or wearing a special shoe, such as a Steward Clog for laminitis therapy.

New technology even extends to horseshoe nails, which are now available with anti-bacterial copper coatings to assist with hoof wall improvement or horses with wall infections. Even traction studs have been improved with new designs and materials in recent years.

The idea of alternative horseshoe materials and alternative or removable attachment systems is the subject of ongoing research at several universities around the world, usually by mechanical engineering students.



Farrier technology extends to the workshops-on-wheels that mobile farriers use; many have tag-along trailers that are custom designed for a farrier's needs with hydraulic features,

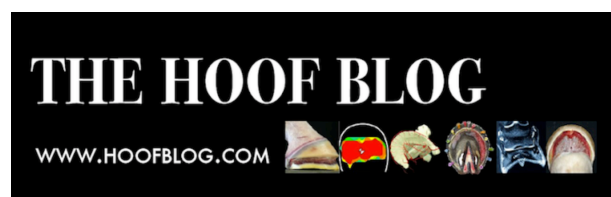
onboard computer systems, and clever space design for tools, shoes, a forge and anvils.

Hoof tech for horseowners

The LTZ Hoof-App (Lehrinstitut Zanger, Germany) for horse owners and therapists won a prize for innovation at the 2017 Equitana in Germany. The Hoof App is a deep dive into hoof information for horse owners, but also has an “online hoof check” to plot coordinates that determine and compare hoof angles based on digital photos and to keep records of hoofcare and disease over the horse’s lifetime.

Several wearable sensor apps are available for monitoring vital signs of horses but impact-capable commercial sensors for the bottom of a horse’s foot are still the province of research studies rather than everyday use in clinics or in the field. Research at Chalmers University in Sweden has been testing the use of wearable thermal hoof sensors to alert farriers or owners to problems in the hoof wall, such as developing abscesses or cracks, and several research centers, such as the CIRALE in France and the University of California at Davis (USA), have been successful in designing useable sensor-equipped shoes to collect data in horses on training surfaces without the use of force plates or pressure mats.

Commercial sensor-equipped products like EquinlTy (UK) or the eStride fetlock boot (UK) are designed to track fitness, show gait symmetry and record stride length. Likewise, the Seaver sensor-equipped girth (France) may give horse owners useful stride-related information that is relevant to gait symmetry or changes that should be shared with the farrier or veterinarian.



Education for farriers

Farrier utilize web-based anatomy tools like Hoof Explorer (Germany) and IvalaLearn (UK) to show horse owners the locations of injuries, as well as for their own continuing education, and many carry freeze-dried leg specimen from HorseScience (USA) for the same purpose. Also new for learning about the hoof are plastinated tissue specimens from plastinate.com (Germany), which can show normal, laminitic or deformed hooves in a long lasting protective transparent casing.

Farrier education is available online now, with the new FEI courses on hoofcare and distance learning opportunities for advanced degrees, especially the Royal Veterinary College’s Graduate Diploma in Equine Locomotion Research (UK and USA), which is specifically designed for farriers. Vet and farrier students, faculty and professionals use the new HoofSearch (USA) service as a digital guide to new research and theses.

Farriers have been helping horses since the first nail was driven through a horse’s shoe. Change was slow to come to the profession but now the world’s farriers are catching up for lost time. Just ask the next farrier you see, and listen to what he or she is doing to incorporate technology into one of the most important professions in the horse world.

Want to keep up with changes in the hoofcare industry? News from and about all aspects of hoofcare, hoof science and farriery are covered in Fran Jurga’s Hoof Blog, published regularly by Hoofcare Publishing at <http://www.hoofblog.com> . In addition, monthly subscriber-based HoofSearch reports provide an index of peer-reviewed research on equine biomechanics technology and other areas of equine movement and lameness.



Craig Robertson,
Founder, Epipole

The equine eye is the one of the largest of any land mammal and how it works has long been debated and remains unresolved. Virtual Reality developers are working with Facebook to produce a solution for this with an app for the Oculus Rift Virtual Reality headset that translates what a horse would see into human vision. This is more challenging than it seems as horses have laterally placed low light eyes that give them an almost 360 degree field of view to monitor for predators creeping around at night (a vision that is like having half an eye on everything rather than focusing on specific targets like our human eyes). Their vision is very capable of judging distance and ground conditions at very high speed which the simulation can reinact with a slow motion effect.

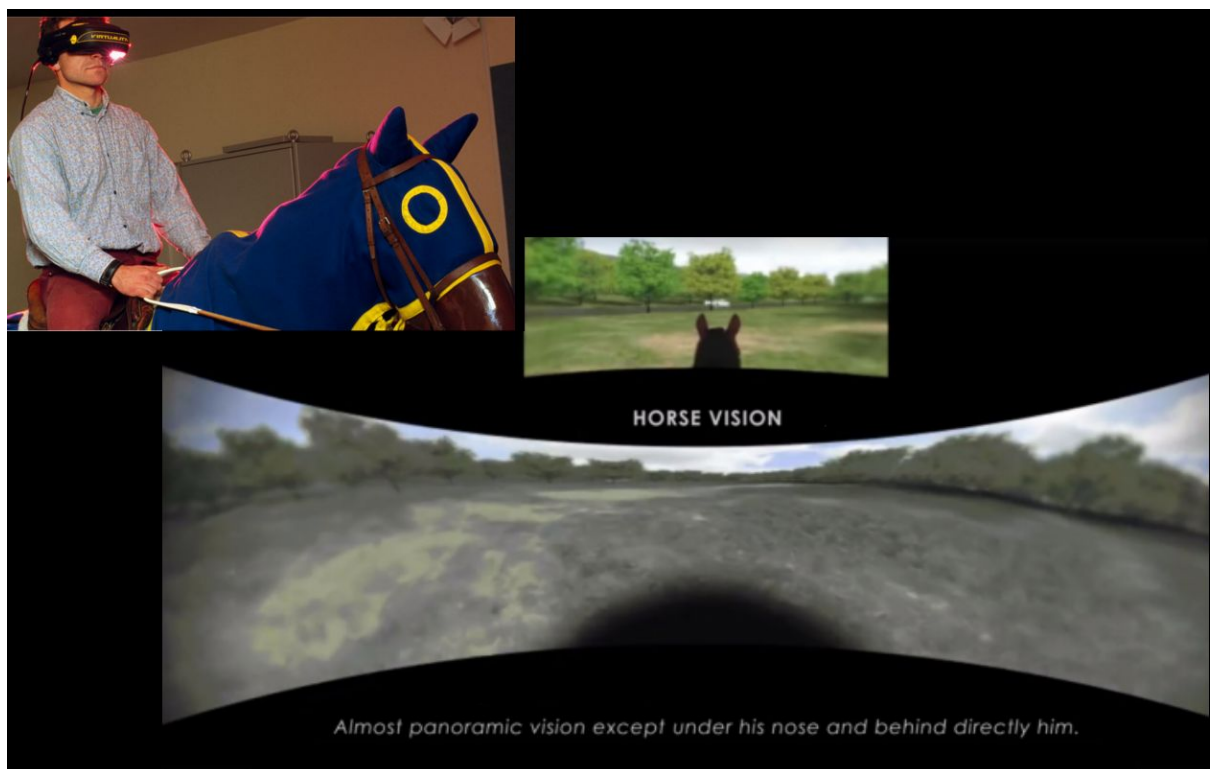
It's hard to begin to imagine how equestrians will be able to hone their skills, and boost the safety and performance of Equines when they can simply don a headset and experience

OPHTHALMOLOGY

exactly what and how the horse sees in a particular environment.

As prey animals a horse's behaviour is linked to the way they see in various situations. For example they will often tilt their head to make objects fall into the "visual streak", an area of high concentration of light sensing cells. They are also very sensitive to motion since this is what alerts them to predators. This motion is first detected in the periphery where their sight is poor and they will act defensively if something moves quickly in that area. They have physical structures that give them excellent night vision but overall focusing is poor so ability to see up close is weak and they may tilt their heads to see things close to them.

Ocular diseases and other issues have a huge impact on the performance of a horse and signs of a vision problem are often obvious to the owner as they include clumsy behaviour and self-injury. Animals with vision problems can often be bullied by more dominant individuals in the herd too.



Eye issues can be split into those that stop light entering the eye and those that stop the light being processed correctly by the back of the eye, in the retina. Front of eye (anterior) problems can come from common injuries such as corneal abrasion but there are a wide variety of contracted issues like ulcers, keratitis, conjunctivitis and uveitis. Many of these can be seen and treated quickly by general practitioners but correct diagnosis should generally begin with a complete eye examination. In some cases referral to a veterinary eye specialist or ophthalmologist is necessary as they have expertise in diagnosis and treatment.

Back of the eye (posterior) issues can be the more subtle to spot and are somewhat difficult to diagnose. They can also continue undiagnosed for much longer which can lead to permanent damage or even blindness. Some of the problems are related to accidents, some to contracted disease and some are congenital. For this reason it is advisable that the back and front of horses' eyes should be screened regularly throughout their life and certainly before sale.

Two of the most typical internal eye problems are glaucoma and cataracts. Glaucoma a condition where the fluid in the eye doesn't drain properly and builds up causing increased internal pressure. This leads to permanent damage of both the retina and optic nerve and eventual blindness. It sometimes occurs on its own but is more often

a secondary effect of chronic or recurrent uveitis. The most common signs of glaucoma include tearing, eye redness, milky cornea, pupil changes and an enlarged globe, sometimes accompanied by vision loss.

Glaucoma can be treated with eye drops and anti-inflammatories medications, with laser surgery to control the pressure. But these may only work temporarily because sadly most horses with glaucoma eventually become blind.

Cataracts appear as opacities within the lens. They can be of any size and when very large they can essentially cause blindness. Signs of cataracts include a whitened lens or some changes in the colour of the pupil opening. They can be inherited or appear after trauma or long term inflammation. If foals are born with cataracts then they may have been inherited or have appeared due to maternal illness or environmental factors.

When they are large, cataracts will also cause inflammation inside the eye (a form of uveitis). Cataract surgery can be successful and there are lens implants that can be used to help restore vision although surgery is complex, of course, and can only be performed by veterinary ophthalmologists.

Regular and thorough screening is key, issues that are picked up early are much more likely to be brought under control. The vet will do a variety of tests depending on what is appropriate. For example: a check of the shape and outline of the eye; the reflexes of



the pupil; a tear test; a check on defects in the cornea; eye pressure using a tonometer and checks for bacteria or fungi. For the inside and back of the eye it is likely that they will use an ophthalmoscope of some kind.

Although the majority of ophthalmic equipment in current veterinary use has had its origins in human retinal imaging there are now imaging options that have been developed or re-developed specifically for veterinary imaging.

The key metrics are safety and quality, by which we mean optical quality. It is the optical engineering that allows the vet to see the sometimes tiny structures that define the horse retina, such as the microvasculature around the optic nerve. The dose of light that comes into the eye must be very carefully measured and kept as low as possible which means that the imaging side of devices must be made extraordinarily sensitive. Here is a single frame taken from a 5-minute examination of a healthy horse showing the optic disc and microvasculature.

Epipole, a UK based retinal imaging company, developed epiCam V specifically for veterinary imaging. It is notable because it is a retinal device of record, meaning that it can take digital video and wide field-of-view images that can be stored alongside the clinical notes for an animal – making it easy to document and study the long term health of an animal.

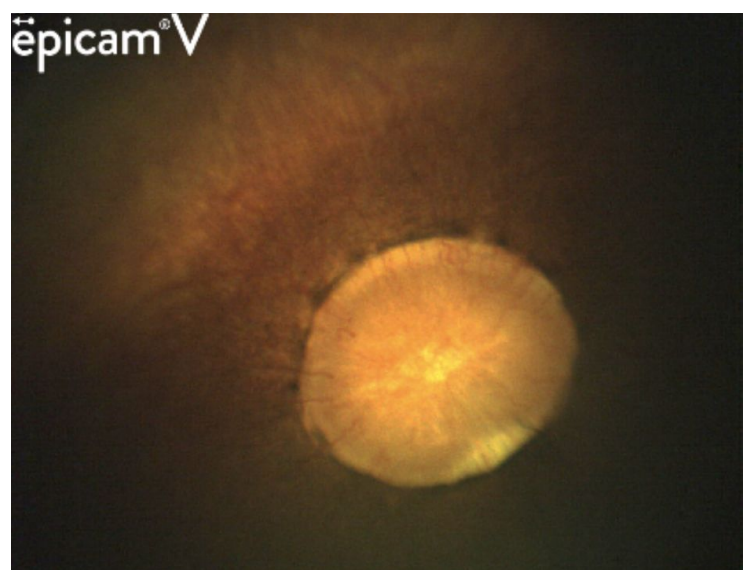
The underlying imaging technology is very flexible, allowing it to accommodate a wide range of eye geometry from cats and dogs, horses and even down to guinea



pigs and some raptors. Video taken with this device is both reflex and artefact free, meaning that there are no odd reflections for the vet to deal with as the horse is examined. Once the images are captured they can be exported to a large screen and examined in minute detail.

The device is used at arms length so there is less discomfort and less distress for the horse since the vet can avoid being in an aggressive pose relative to the animal – this means that a significantly longer imaging session can take place and thus a wider view in the eye may be obtained.

epiCam V connects via USB to a laptop or tablet (such as the Microsoft Surface) which means that it benefits from the dramatically improved screen resolution and depth of colour, allowing the vet to pan around the inside of the animal's eye to capture the structures and detail as they wish.





Aidan J. Connolly,
President & CEO,
Cainthus

MACHINE LEARNING & AI

Blockbuster movies like the Terminator have done a great job of making Artificial intelligence (or AI) become synonymous with smarter-than-human computers plotting to take over the world but AI has already infiltrated our everyday lives in ways that we not only accept but appreciate. A banner ad on a website showing Horseware's new boots now seems timely – weren't you just talking about those in the vicinity of your Amazon Alexa enabled smart speaker? Yet consumers say it isn't scary, it's convenient!

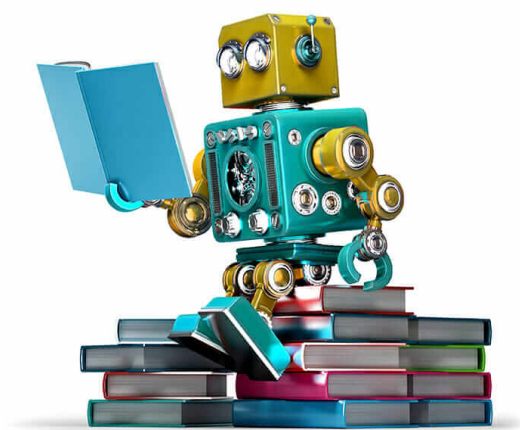
Let's be clear on artificial intelligence: at its simplest definition it is the ability of computer systems to perform tasks that normally require human intelligence. This includes visual interpretation, recognising objects both from images and in the real world, speech recognition including emotion, decision-making including everything from how to park a car to how to play chess (and win!) and translation between languages. The truth is we have only begun to touch the surface of what AI can do for us. Industries such as financial services, healthcare and automotive have taken the lead, but what are the opportunities in the equine world?

With the obvious exception of the gambling side of the Horse Racing industry the Equine industry lags other sectors, but the potential for incredible insights derived from AI is certainly there. Today AI is used to diagnose some radiology images better and faster than humans can. If this were applied in the race

tracks, fields & horse stalls imagine the time and money that could be saved. Consider horse racing, where thousands of radiographs are reviewed again and again by veterinarians, despite initial reports that, in theory, have already come from an equally competent source. What AI could bring is a transparent diagnosis, one that could be trusted without reviewing again and again, a redundant exercise which itself is often fatiguing and could lead to incorrect analysis.

Summarising these, how would Artificial intelligence change the way we interpret five data streams?

1. Still photos of horses.
2. Video footage of horses, exercising or walking.
3. Sensor data of motion, digestion, temperatures.
4. Aural sensor data of horses breathing, coughing.
5. Augmented vision from infrared or multi-spectral cameras.



Isn't this a threat to how we currently buy, train, feed and care for our horses?

AI has been used to diagnose ailments in humans using observations and data concerning a person's current illness and cross checking it with their medical history. Not only

does this offer a more targeted treatment, these applications often see far less mistakes than a human counterpart. This same technology is also streamlining processes in the medical field, saving time and mistakes,

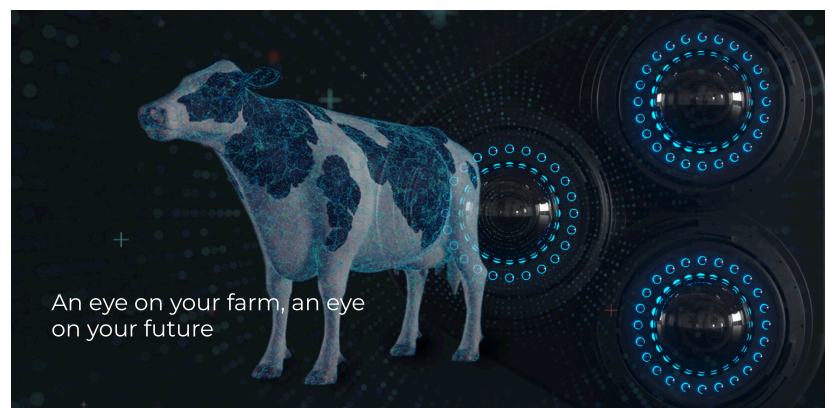
both of which are costly. In short, any application in the medical field where AI can help in human medicine could be applicable to horses as well.

When used in conjunction with other technologies, artificial intelligence can truly show its benefits in predictive analysis. Sensors, for example, offer insight into our hooved friends. Under saddle, they are already measuring heart rates and breathing during exercise. When jumping, sensors are measuring a horse's vertical distance and horizontal height. Think if we applied AI to this data? Programs could be designed to build the ideal workout for horses to improve certain abilities or physical development. Once other factors are considered, such as turf, weather, humidity, etc., could AI not tell a rider under what circumstances a horse will perform better? Clearly this is a trainer's job now, but we're already seeing this with humans wherein an app (check out Vi) does exactly this. This could be an alternative or auxiliary training method for horses.

AI could also tell riders when their horses are performing better. Just as humans, horse temperament can exhibit favourite activities or preferences; a preference to trot, canter, or just favor the side they are most comfortable with. While riders try to evenly work both sides, knowing exactly how even that work load is can be challenging. Likewise, should sensors evaluate the horse for this type of balanced workload, machine learning could evaluate the workout itself and let riders know how effectively the training is and when improvement is seen. Alternatively, AI could alert an owner when a horse is beginning to fault or needs a day's rest.

Combined with our increased understanding of nutrition and the microbiome, artificial intelligence could also be applied to

determine the best recommendations for nutrition and feed based on genetics, exercise, field conditions, turnout time, temperature, and all the other factors that affect what a horse needs and how it can perform at its optimal ability. AI could create precision nutrition, or individual recommendations for every horse in the barn.



Predictive analysis powered by artificial intelligence could also be applied to horses at rest. Whether stabled or in the field, performance horses are prone to injury. Often there is no other indication other than swelling or an off leg. Yet with AI, these symptoms could be brought to an owner's attention in advance of physical indications visible to the human eye. Measurements of heart rate and breathing could give early indication that an animal is uncomfortable or under stress, potentially allowing for veterinarians to get a jump on the ailment before it has advanced too far. Likewise, thermal imaging cameras using AI to analyse the data detections such as heat or swelling could also determine injury.

Alternatively, cameras or aural sensors in the barn could also monitor horses for coughing, signs of restlessness, or lack of eating or water intake, obvious signs of colic. Such is already the case with MagicAI, which uses artificial intelligence to determine if a horse is in distress, can give owners and veterinarians hours of lead time that might otherwise have been lost.

Our company Cainthus, have similar technology for the Dairy industry using computer vision, an application of AI which analyses data in order to align to computer learning to identify issues before they become a problem. Installed cameras use pixel pattern recognition to observe cows and identify if cows stray from their usual intake of food or water, analysing data and detecting deviations. The Cainthus system sends an alert to farmers through their smart phones, allowing them to respond faster to help the animal. What about other animals? AI platforms such as Cainthus are extremely complex, multifactorial and expensive to build, costing tens of millions of dollars. Once built however transitioning the learnings to other species becomes faster and faster to achieve.

Another application not seen yet but could certainly open the doorway of communication to animals, is the ability to understand what horses (or dogs or cats for that matter) are telling us through their aural communications. Artificial intelligence helps in a couple different ways; first, the sensor needs to identify which horse sounds are associated with different sensations, and second, analyse facial and body language for stress or emotions. Humans are not necessarily blind to this but given how quickly an expression can come and go or how quiet and nearly imperceptible a neigh or nicker can be, these are often missed in an environment with so many distractions. While this technology is not officially on the market, we are no more than a decade away from this as a reality.

Numerous companies have worked on predictive analysis for all types of competitive sports. AI has been used to predict a Kentucky Derby winner and while this hasn't been repeated with consistency, if it happens again, it would certainly put a wrench in many a gambler's strategy.

Such brief examples, while within the realm of possibility, will require data in order to become reliable predictors and right now, that data is not available. As more artificial intelligence companies are created and the technology itself becomes more ubiquitous, it will completely infiltrate the equine world. This often occurs when a technology is created for one industry, but it's applicability could be broadened by seeking a counterpart with equine knowledge. Working together, this new company can be created by combining both sides' knowledge and expertise. Perhaps instead of starting with a revolutionary breakthrough there is potential for the equine world to leapfrog initial developments. If you bought your first cell phone today, you wouldn't settle for a flip phone, would you? You'd probably get at least a smart phone and possibly even an iPhone 10.

Thinking outside the box AI poses potential existential threats and disruptions?

Can betting on Horses and horse racing continue to be profitable in a world of increasingly perfect information fueled by AI?

Is the horse segment large enough in commercial size to sway investors in tech to invest in it and bring the best ideas to market?

Will the best investors fund Horse tech startups after all other opportunities have been exhausted ?

Human athlete analytics (Kitman Labs and StatSports) might provide a better pipeline for future equine tech than trying to repurpose technologies currently used in other livestock species.

AI technology has the potential to change the horse world forever and when it does, our interactions with our hooved friends will never be the same.



Sandra Murphy,
Founder, Equidiet

NUTRITIONAL HYDROTHERAPY

Mother Nature did not get it wrong when she designed the horse's digestive system and the feed that works best with it. With equines being 'prey animals' their natural instinct is 'fight or flight' when danger is real or perceived. They must be prepared to travel long distances at speed to evade capture. The natural way is to take in fuel and fluid through forage as they move along to ensure they stay ahead of their predator! However with the modern horse, the danger is more often perceived than real but the horse's instincts are still very powerful. Therefore when a horse is under stress whether real or perceived the tendency to take on water is diminished as the sympathetic nervous system prepares for their escape. Due to more consistent higher temperatures and horses travelling further now more than ever, the traditional methods to encourage fluid uptake such as electrolytes, plain or flavoured water will just not suffice for high level performance equines.

Transportation of equines is a huge industry and one that is known to trigger psychological stress, especially in the younger animals leading to substantial losses of body fluids, this can cause a horse to become dehydrated leading to further complications such as loss of body condition, loss of performance, colic and in some severe instances death.

Attending equine events can be another psychological stressor when all they can see are horses seemingly running in every direction. This perceived danger can create another very stressful situation for the horse, especially young or inexperienced horses, so being relaxed enough to drink in these sort of situations may be impossible for some horses. It is only when horses become desensitised through repeated exposure to these apparent threats, do they relax and respond in a less instinctual way, but you can now see that psychology plays a huge role in equine behaviour and the regulatory response to fluid uptake.

This is where the new practice of Equine Nutritional Hydrotherapy (ENH) comes in, this



innovative new concept works in the most natural way. Even though the modern day horse does not really have predators, the instinct to forage is still one of its strongest instincts which can override the regulatory 'thirst' response because forage typically contains between 40% and 80% water, therefore whilst evading capture it is natural for horses to take in fluid through grazing whilst on the move.

At Equidiet (UK) Ltd we recognised this and have developed quality liquid fibre diets that provide ENH in response to the difficulty the equine industry has hydrating horses; especially during times of stress whether it be due to perceived danger, heat or exertion. ENH also addresses the considerable increase in equine gastrointestinal and metabolic disorders such as Equine Metabolic Syndrome, Equine Gastric Ulcer Syndrome (EGUS), Laminitis and stereotypical behaviours primarily caused by feeds high in non-structural carbohydrates (NSC's) according to several research papers, and heightened stress levels caused by modern management practices.

Equine Nutritional Hydrotherapy uses this concept to great effect as it is "the ability of a good quality, natural fibre feed to deliver an adequate level of hydration to an equine to balance body fluid".

The practice of Equine Nutritional Hydrotherapy (ENH) encourages not only the use of natural whole food nutrition, but also allows for an increase in the hindgut reservoir of fluid available for the horse to use as and when required and to balance the body fluids to reduce the detrimental effects of dehydration.

This is now proving to be an invaluable resource for veterinarians within the clinical environment both in the UK and in Europe as

these formulations can also be administered via naso-gastric tube directly into the digestive system by gravity flow.

ENH can be provided through various means, including the liquid fibre formulations that use quality forage based ingredients which allow voluntary uptake of large amounts of fluid and quality fibre nutrition that works in synergy with the natural function of the digestive system. Only structural carbohydrates including soluble fibre allow water to be carried within their molecular structure, however traditional grain based feeds do not have this molecular structure and cannot provide adequate water to balance body fluids.

Equine sports are on the increase with tests getting harder, fences getting bigger and distances getting further, and the movement of equines across the country, continents and around the world is becoming more widespread. It may take years to evoke change, to encourage a more fibre/hydration based diet for the modern equine as old traditions are difficult to alter, with many management systems that seem to be 'set in stone'.

More recently with changing temperatures urgent changes need to be implemented and Equine Nutritional Hydrotherapy is the way forward. It has to be recognised as the new 'norm' when it comes to feeding and maintaining performance, otherwise we will see more and more cases of dehydration, heatstroke and deaths in the future. Preparation is the key, optimising hydration and preloading into the hindgut is the only natural way forward. Keeping optimum hydration and fluid balance is vitally important and should now form a crucial part of diet planning moving forward. It is impossible for

starch to carry fluid to the hindgut reservoir, therefore we must now look at providing a way of hydration not just with plain water or increasing salt to encourage uptake but also optimising the hindgut reservoir with good quality fibre replacing starch feeds for horses.

To some, this approach may seem hard to comprehend, as traditional methods seem to dominate without question, however weather conditions are changing and that means we have to adapt our way of feeding to these extreme conditions that are becoming the 'norm', according to recent Met Office predictions.

If organisations are serious about the welfare of performance horses, then the new practice of Equine Nutritional Hydrotherapy must play a role in the planning of diets by the Equine Federations and even included in the planning of events where the management of Equine Health is major issue.

We need to realise that our temperatures are going to be going from one extreme to another and we must prepare for this by

rather than staunchly upholding old traditions if we want the future of our performance horses to be secured.

Equidiet (UK) Ltd is at the cutting edge of this innovative bio technology by providing highly palatable liquid fibre solutions that work in synergy with the natural processes of the equines digestive system. Because of their high quality fibre ingredients, they provide adequate energy. to keep up with the demands of high performance and they also support horses in the clinical environment to recover in a healthy more natural way.



Equidiet (UK) Ltd
Delivering Hydration & Nutrition on Demand

The home of
EquidGel The revolutionary new concept in Equine Nutrition
LamiGel

MADE IN LINCOLNSHIRE

THE Pet & Equi awards
AWARDS CATEGORY FINALIST
2016
REWARDING EXCELLENCE IN THE PET PRODUCT INDUSTRY

www.equidiet.org.uk

embracing change and accepting new ways



Prof Emmeline Hill,
Equine Geneticist
& CSO, Plusvital

NUTRIGENOMICS

With the sequencing of the equine genome in the last decade there is now an expanding and readily available spectrum of genetic technologies for a variety of applications in horses. Equine nutrition has

always been an area of much research and interest in the past due to the effect diet can have on performance and health. The two terms nutrigenetics and nutrigenomics refer to the interactions between the genome and nutrition. Nutrigenetics particularly refers to how an individual's unique genetic make-up affects their response to dietary nutrients. Nutrigenomics refers to how different types of food affect how the genes in DNA are "read" and which genes are "turned-on" or "turned-off". This "turning-on" or "off" of genes is known as gene expression.

A good example of this in humans is celiac disease: when certain individuals eat gluten this affects gene expression and initiates an inflammatory reaction within the gut. Clinical signs of celiac disease can be vague but genetic testing can highlight gluten intolerance and can allow the individual to take steps to alter their diet before the symptoms become more severe.

Personalised Nutrition?

In human nutrition the hope is to use genetic testing to plan "personalised nutrition" and several companies now exist which provide such genetic testing both alone and also in combination with other types of tests. The results of such testing are then used to design a personalised diet for the person undergoing the testing. The science however is still in its infancy and a greater understanding of all the

factors, including genetic factors, which contribute to dietary effect on the body and physiological response to diet must be obtained.

Similarly to humans, each horse has a unique genetic composition or "genotype" which means that each horse may respond differently to nutrients in the diet. Therefore, what is observed in real life or the "phenotype" of the horse will be affected directly by both diet and the individual horse's unique genotype.



Two examples in horses of genotype interaction with nutrition resulting in a real life clinically observable disease include:

Polysaccharide Storage Myopathy type 1 (PSSM1) is a form of a chronic tying-up disease in horses. There is a genetic defect present in the mechanism of storage of glucose obtained from the diet as muscular glycogen. It is observed frequently in American Quarter horses and related breeds, Draft horse breeds (especially Belgian Drafts) and Warmblood breeds but has also been diagnosed in many other breeds. Clinical signs can include stiffness, awkward gait, pain on palpation, reluctance to move, sweating and brown coloured urine. Episodes are increased by high grain diets. The genetic cause of PSSM1 is

known and a genetic test can identify a horse with the disease. This allows the diet to be modified by reducing grain or using one of several commercially available feed formulations specifically designed for these horses.

Hyperkalemic Periodic Paralysis (HYPP) is a muscular disease caused by an inherited genetic mutation which affects sodium channels in skeletal muscle cells. The disease affects American Quarter Horses and related breeds. Clinical signs observed can include muscle twitching, weakness and even collapse after exercise or stress. A genetic test is available which can identify horses with this disease. Once a positive test is returned a change of diet is a large aspect of the advised treatment/management strategy. The feeding regime usually includes avoiding high potassium feeds, such as alfalfa, and providing many small feeds during the day and also preventing dehydration.

These are two examples of situations in horses where a genetic test can be carried out to identify horses with certain genotypes that are at high risk to develop the disease. Once identified, a change to the diet can be initiated which results in reduction or prevention of the manifestation of the disease. There are several other diseases in horses in which diet is a large contributing risk factor that are the subject of genetics research, such as for example laminitis. The aim of the research is to identify horses at high risk of developing the disease, increase understanding of the interaction of specific parts of the genome in these horses with the different nutrition components of the horse's diet and to formulate specific diets as part of a treatment/management plan.

Next Steps

The next logical step from this work is to look at healthy individuals and to harvest the information contained within their genotypes

to tailor a specific diet to the individual based on this data. The aim of this approach is to fine tune performance for competition and to promote optimal health and immunity in the healthy individual.

The requirements and reactions to specific foods of one horse may be completely different to those of the horse in the next stable regardless of similarities between breed, sex, age etc. One contribution to these differences is the naturally occurring genetic variation among individuals. Individually tailored diets may be composed, in theory, of either large changes such as increasing or decreasing relative proportions of certain key nutrients (e.g. fats, carbohydrates etc.) or may include the identification of specific single molecules which are required at higher concentrations in the diets of certain individuals only (e.g. amino acids, metabolic molecules, molecules involved in energy metabolism, etc). Such genetic tests could also potentially be used to identify "deficiencies" of certain molecules in specific individual horses or the genetic requirement for higher dietary concentrations of these molecules within these horses.

While the field of study of nutrigenetics/genomics is in the early stages there are already well documented examples of disease situations where using the data gained from genomic evaluation to amend or alter individual diets has had a hugely positive impact on well-being. There is still much understanding to be gained about the interactions between the genome and diet but it is only a matter of time before the next example of a real life application within the field is discovered. Specifically within the equine industry in which horses compete so regularly and at such high intensity there is an appetite to improve the performance efficiency within competition as well as overall health. Individualised diets may be one realistic option to achieve this.

EnerGene-Q10

In a significant development for both the company and the wider equine nutrition industry, Plusvital announced in December 2017 the launch of EnerGene-Q10, the world's first nutrigenomic supplement for horses, that contains the compound Co-enzyme Q10 (CoQ10).

Based on research published in conjunction with scientists at University College Dublin and Trinity College Dublin, Plusvital has shown that the genetic background of a horse has a significant influence on the production of CoQ10 in horse muscle cells. CoQ10 is a key nutrient required for the generation of energy in the mitochondria of the muscle that is particularly important for sustained exercise. Increased levels of CoQ10 may result in more efficient energy production, delayed onset of fatigue during exercise, an improved response to exercise training and enhanced recovery following intense exercise.

The research revealed that Thoroughbred horses that are T:T (suited to exercise requiring stamina) genetic types, as identified by the Plusvital Speed Gene Test, produced significantly lower cellular levels of CoQ10 than the other (C:C and C:T) genetic types, but that these levels can be restored with supplementation. In follow-up field trials, the scientists found that CoQ10 concentration in the muscle increased by 40% following nine weeks of oral supplementation.





Dr Tim Watson
BVM&S PhD
MRCVS. Waterlane
Equine Vets & Lead
Lipogems Equine

STEM CELL & REGENERATIVE MEDICINE

Regenerative technology covers a field of work where Medics have been working on a huge variety of biological technology options for healing using the body's own cells and tissues. Essentially regenerative work is referred to as a therapy which combines research from tissue engineering and molecular biology to replace or regenerate cells, tissues or organs in order to restore or establish normal function. I regard it as technology rather than medicine or science because it is a series of technologies that leverage existing science to activate the body's own healing mechanisms. The tech available is already diverse and this is leading to extensive confusion and misunderstandings as there are overlapping areas eg. not all regenerative therapies use stem cells.

Some of the most effective therapies isolate cells, some expand cells, some isolate particular proteins or cells known to have regenerative capabilities and potential. Some techniques are lab based, some are stable-side treatments whilst others take weeks to complete. On top of all this many technologies are inexpensive and some are incredibly expensive, others are subject to strict regulations and so aren't allowed to be utilised in particular regions of the world. Insurance companies are also in a state of flux about regenerative therapies – some will consider nearly any technique, whilst others have a blanket no to regenerative therapies within their policies.

There are a wide range of therapies on the market with diverse origins, scientific backgrounds and evidence base for Equines. Here are the main biological technologies available in the market today:

IRAP: IRAP stands for Interleukin-1 Receptor Antagonist Protein. IRAP therapy is based on the production of regenerative and anti-inflammatory proteins created by the horse/dog/human's own blood cells. IRAP is syringe system which is used to produce an autologous conditioned serum (ACS). This ACS contains active quantities of autologous anti-inflammatory and regenerative cytokines. The treatment involves the harvesting of up to 50ml of the horse's own blood using a collecting syringe specifically designed which contains glass beads. After an incubation period of 24 hours, the blood mixes with the



beads, then is spun in a centrifuge at a laboratory which separates the serum from red blood cells. This is then injected into the affected site, this is usually repeated up to three or four times over the course of weeks for the first round of treatment. This biological treatment is believed to have the potential to induce regeneration or stop degeneration and is mostly utilised in joints, but has been used for non-surgical tendon injuries.

Platelet Rich Plasma or Autologous Platelet Therapy: Platelet-rich plasma (PRP) is a concentrate of platelet-rich plasma protein

derived from whole blood. For animals the blood is harvested and then processed in a stable/theatre side kit that contains a simple centrifuge to remove red blood cells. It has a greater concentration of growth factors than whole blood and has been used to encourage a healing response across several specialties.

Stem cells : Stem cells can be derived from a number of sources including bone marrow, adipose tissue and embryonic tissue. These cells are generally harvested in one procedure and then cultured under laboratory conditions before being administered at a later date. These treatments are scrutinised by a lot of scientific legislation and licensing for autologous and allogenic stem cells which is the same for veterinary and human use of cultured cells. The period of time over which this treatment is complete can be over a number of weeks. There is a further breakdown of these types of cells; unipotent, multipotent and pluripotent stem cells.

Tissue grafts: The most popular in this field is an adipose tissue graft, a complete cellular matrix and scaffold. The only technology that offers this currently in the market is Lipogems® which is a non-expanded and micro-fragmented adipose tissue graft that is injected into damaged areas of the body in order to provide a cushion and structural support while promoting a healing environment. The Lipogems® process preserves the natural healing properties of adipose tissue by maintaining the fat's vascular stromal niches. The micro-fragmentation of the tissue is key to the treatment process as it triggers the body's own damage response mechanism. Lipogems has been directly translated from human application to veterinary application - No lab culturing - No cell isolations - Lipogems is a complete tissue structure graft. There are no other comparative treatments that trigger the body's own damage response mechanism in a single step; non-enzymatic, no-centrifuge procedure that is completed on-site, under an

hour either in surgery for small animals or under standing sedation for equines.

The future for Regenerative HorseTech

The field of research and scientific understanding of how tissues and organisms regenerate and repair their injuries and diseases is still very much in its infancy. Every trial and case and new technology allows for more and more research into how each component is able to work to repair damage. As each new technology launches on the market the sceptics and practitioners naturally expand the options in this field by conducting comparative studies for one treatment against another technology. The more cases conducted, the more boundaries pushed the more veterinary surgeons and doctors can understand and appreciate the parameters for assisting the body to heal rather than prevent an action by the body with chemical interruptions.

The lack of requirement for drug use and invasive surgery is a huge pull for animal and human treatment. The simpler the treatment from the design of clever and simple to use technology vastly reduces complications from complex surgeries and or drug use. For sports horses and human athletes, the draw for less drug use is also a huge step forward. A simpler recovery process and rehabilitation is also an advantage. For animal owners they can have their pet or horse treated quickly and effectively and with many of the treatments for horse they can be done stable-side. The option for Cryogenic storage of material for use at a later date is also opening very exciting possibilities. Perhaps that's the future role for high street bank vaults? Early treatment with regenerative technologies can also reduce the need for further more invasive surgical options, or increase the time before more invasive procedures are likely to be needed and this is complemented by increasingly sophisticated

sensory/detection technologies that are make it possible to detect and even predict injuries.

I have over twenty years experience in equine practice and it's clear to me that the regenerative treatments that I provide like Lipogems are radically different in that they are relatively noninvasive, quick, cost-effective and safe. Horses can be treated stable side under standing sedation in less than an hour and while follow up scans and appointments are often recommended the treatment can be done on the same day. Together with this comes a huge responsibility and at Lipogems we're committed to making sure our technology is used responsibly, by the right vets, for the right cases, for the right results and that these get published to advance medicine. We have developed a custom training programme and selectively train veterinarians around the world in the use of Lipogems and will only provide treatment kits to practices that have completed training with Lipocast Biotech UK and signed the Terms and Conditions of Accreditation.

The journey for regenerative tech is just beginning and it presents a huge opportunity for HorseFirst innovation because:

- > There are very different regulations for treatments for horses Vs humans.

- > The high monetary value of horses makes pioneering new approaches desirable

- > The high cost of surgical treatments, unpredictable outcomes and length of recovery makes it not just desirable to adopt regenerative tech but also a financially prudent decision.

- > Researchers are able to accurately measure and analyse performance before and after therapy and adherence to rehab can be much more accurately measured/controlled.

The future of regenerative medicine will owe a huge debt to smart Horse owners who so generously support their Veterinarians being innovative and publishing their work as this is fundamentally what is needed to help innovative new approaches develop and come to market quickly and safely.



Lipogems Equine

A New Generation of Regeneration for Your Horse



Lipogems® Equine is a new innovative application of regenerative technology, it is **unlike any other regenerative therapy** available for treating your horse or pony.

To get in touch with our team to discuss how we can help your horse

Read the full text on this published research by clicking on the following link:
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0186247>



David Doherty,
Curator, HorseTech
Market Report

HORSEFIRST INNOVATION & TRANSLATIONAL MEDICINE

The Healthcare industry faces major challenges as technology increasingly enables disruption of the status quo and the prospect of reducing costs. Before a HorseFirst approach to innovation makes any sense it needs to be appreciated that the Human Sickcare industry is a 'crapitalistic' sales and marketing success story but a colossal economic and scientific failure. Further complicating this is that medical science has become absurdly politicised and biased and healthcare has now become the world's most complex make-work business and this means there are now teams of people doing things that aren't in demand who will not just tolerate more make-work initiatives but actively work to promote them while resisting any attempts to challenge the status quo.

The US Federal Government alone has spent over \$35Billion on MACRA-MIPS subsidies to get Doctors using Electronic Healthcare Records. This is technology that Doctors are forced to lease that makes it more challenging to do their job. They essentially pay to input data that is then sold on by the EHR companies to third parties including the government. Patients get the worst possible outcome: costs are passed on so that they get super expensive healthcare and little/no means of benefiting from the data being collected (in most cases they aren't even able to access their healthcare records).

The world's most valuable corporation Apple is currently in a position to disrupt

things with the Apple Health app (which already allows millions of Americans to download their healthcare records to their mobile) but this is currently no more developed than what Equestrians have had from their Vets pretty much since the invention of the fax machine. I worked in a Vet surgery 25 years ago and nothing was thought about sharing records with clients or faxing them on request to other Vets, trainers and owners.

Veterinary Vs Human Medicine

The Human medicine market is a captured market which is strikingly different to the free market in Veterinary Medicine where an Equestrian has a much wider choice when it comes to managing health issues. Ask a senior Medical Doctor to reach out and touch something at work and they will invariably land their hand on something that they cannot tell you the cost of, try the same with a competent Equine Vet and they can normally tell you exactly how much they paid, what they used to pay and what they want to be paying. This

fundamentally undermines the capacity to adopt low cost tech in the human health market because there's far too many people profiting from keeping the status quo than from disrupting it. The contrast between software used by Equine Vets and Human Medics is particularly stark eg. get a demo of a

Vet using practice software powered by DragonVeterinary.com and compare that to how human medics hen peck at keyboards as data entry clerks for insurers using highly regulated software that's been designed/built 10+ years ago by a

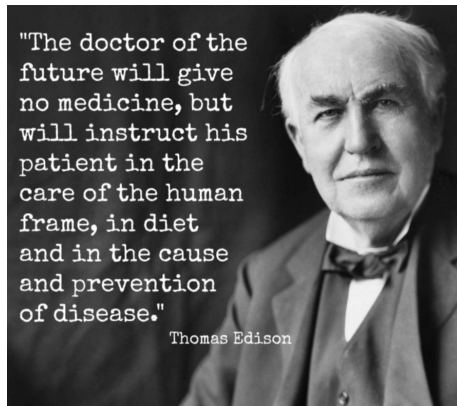
If your Doctor
prescribes you
medication without first
asking about
- your diet
- your sleep
- your exercise routine
- your water



committee of people with secure government jobs. For the vast majority of corporations in the healthcare industry there is little to no financial interest in using tech to reduce the need for staff as these businesses are about creating jobs. In 2021 most

Patients have still never even visited their Doctors website, emailed or sent a SMS or saved their Doctors mobile number to their mobile. While nearly every Equine Surgeon in England/Ireland lists their mobile number on their website their human medicine counterparts have armies of secretaries who you reach via switchboards, telephone call trees, snail mail, etc. The administrative burden in human healthcare has exploded and Politicians love it because it's a massive reliable source of local employment. Unsurprisingly non-profits have exploded in this sector and the level of productivity is at a level that just wouldn't be even contemplated in the Veterinary Market.

Your local Equine Vet probably has a Digital X-Ray machine, a HD Ultrasound scanner, thermal imaging, a scope and Alivecor pocketable ECG machine but it's highly unlikely that your GP practice has any of these technologies. A Vet pays no extra to use equipment whereas insurance and training costs for Doctors make it impractical eg. the additional insurance for a Family Doctor with a special interest in imaging qualification to use ultrasound in her Clinic might be €30,000/year while the lease cost for the technology itself can be as little as €1,600/year. Technologists with fancy words like Artificial Intelligence and Blockchain claim to be able to do everything a Doctor does but the reality is none of these projects are getting legitimate medical system approval because we haven't arrived at a time when we can just accept that a Patient died because of a computer. In the real world a



computer can't take responsibility and be held to account for a decision that harmed a person.

We also need to accept that the HorseTech Market isn't a subset of the Equine Industry. HorseTech isn't just being used to look after

Horses: it's being used to treat and optimise the production of the crops that will provide a horse's nutrition, the microbes that outnumber the equine cells on a horse, the stables that home the horse, the vehicles that transport horses, the therapy that treats the horse, the regenerative medicine that renews the cells, the quantum medicine and telomerase reactivation that will reverse the age of the horses cells, etc, etc.

HorseFirst

The equine and human are very different but when it comes to the opportunity to adopt innovative medical technology the horse is probably the best model for innovation for several reasons:

Focus: For those seeking the advancement of human health the Equine medicine model is enviable because the focus is on prevention, maintaining and improving health and well-being. This contrasts starkly to western medicine for humans that is primarily focused on the identification, diagnosis and treatment of disease rather than trying to prevent it developing or tackling the cause of it. There are no huge businesses with well funded lobbying teams supporting the cause of diseases in horses. "Evidence" in the equestrian sport industry means horses that win against competitors in stark contrast to the human health industry where it's all too often the legally protected opinion of small powerful groups who are influenced by a wide range of incentives. The most fundamental fact about

the ideas of the political left is that they do not work. Therefore we should not be surprised to find the left concentrated in institutions where ideas do not have to work in order to survive.

Size of the horse: the form factor of technology can now be rapidly reduced in size but it often starts out bulky and static. These issues don't present problems for the Horse First innovator as a horse can easily wear bulky equipment that would be incredibly uncomfortable to a human and can be homed in a stable. The horse's health is also easier to monitor because it has larger organs and is always available because it doesn't have commitments like a job to go to, food to prepare or a family to rear, etc.

Mobility of the horse: the biggest chronic condition in the world is sleep deprivation yet few people actually want to monitor their sleep and nearly no one wants to take responsibility for the quality of sleep as it's made complex by so many human things that are challenging to deal with eg. our obsession with entertainment and communication (which is why we stare at LCD screens in bed and leave bleeping devices switched on while we sleep). Even the least invasive discrete sleep monitoring tech can have a substantial disruptive effect on human Patients (who will often dream about the devices or lie awake thinking about them) whereas with the horse there's no evidence that they even know it's happening.

Regulations: For very good reason it's required that medical innovations pass rigorous regulations but we're at a stage in human medicine where the regulators have huge financial incentives to find a reason not to approve an innovation regardless of if it

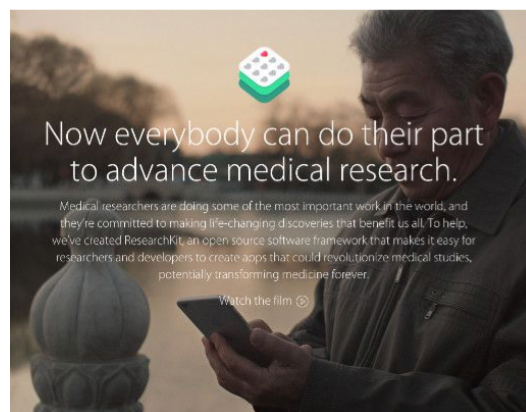
benefits a Patient's health. Big business and highly influential centres of medical research are creating dogmatic beliefs that are also systematically thwarting alternative approaches.

Ability to control variables: Invaluable to the actual quality of research this is something that you won't read much about in the human clinical trial market but from work I've done with the Contract Research Organisations who run clinical trials and you'll be stunned at the ingenuity of a human to fake their behaviour to

avoid disappointing their Clinicians. Patients faking taking their medicines is normal and to be expected, but it costs £200k each to monitor some Patients on new drugs and they're getting away with having the results from small Patient numbers used to define future best practice when anyone with half a care knows

they're doing other things that aren't being documented (not taking their medications, using alcohol/drugs, taking additional meds/remedies that they're not telling their Doctors about, etc, etc, etc).

Cost of administritivia in Human Clinical Trials: Apple are completely disrupting the human clinical trial industry because they offer with their ResearchKit platform the ability to collapse time and space yet practically no one in the Clinical Trial Industry wants to embrace this. I recently spoke at Europe's biggest Clinical Trial event (video here) to an audience who had never participated in a clinical trial! 99.9% of the data collected in Human Clinical Trials is collected today inside the four walls of clinics.



Increasing Urbanisation:

Democracy is handing ever more power to urban populations who have little idea or concern where their food and water comes from never mind an understanding of the equestrian culture on which their comfortable habitats were built. Political and Entrepreneurial minds are capitalising on this in imaginative ways that will drive further distance between the views held by equestrians and urban populations.

A example of this dangerous trend can be seen by the AnimalAid charity in London that peddles a myth that exploits the growing knowledge gap and lack of understanding of the racing industry amongst urban public transit users. I wonder if the creatives ever thought about the idea of trying to maintain control of a 500kg dog with a riding crop or that an Equestrian would never even think of trying to transport horses in such confined conditions?

Because the internet has been consolidated by giant advertising corporations the vast majority of content seen is that which panders to popularity, shares and outrage which pretty much makes it a road through an intellectual slum when it comes to the understanding of the complexities surrounding equestrian sports. Remedies are difficult as people generally don't want to read anything that disagrees with or doesn't fit with their preconceptions and today's internet content is based on parasitic business models where the content is free in exchange for the ability to sell the readers data to the highest bidder.



Political Correctness & Censorship:

It's becoming increasingly challenging to produce truly innovative work within the scientific community as the major universities get the majority of funding from

governments and there are so many vested interests at play. As few are now investing in quality journalism and "Science journalists" are typically just those with journalism degrees and you'll often see them cut/paste press releases rather than analyse what's being done. It's rare to see any effort put into the potential downsides, adverse effects or the harmful direction that tech could be taking society in.

With most graduates not needing their degrees to do their jobs and Universities generating such huge profits from tuition fees an exploitative system has mushroomed. We're now seeing an expansion in the duration of vocational degrees, which together with the increasing cost of a veterinary degree is inevitably going to have a huge impact. Working hour directives are also going to make it impractical for Vets to put in the hours of experience that enabled generalists and so it's likely the future will all be about specialisation. At some point there will also be a brain

drain from the Profession eg. if you are young and have a high enough IQ and the ability to apply yourself enough to excel as an Equine Vet you'll probably be able to work out countless better ways to spend 7+ years and run up €400k in student debt...

While the 'snowflake' generation has arrived in force in Universities in the western world and is busy at work in 'safe spaces' doing the work of word police and ensuring there are no

The most fundamental fact about the ideas of the political left is that they do not work. Therefore we should not be surprised to find the left concentrated in institutions where ideas do not have to work in order to survive.

THOMAS SOWELL

differences between all the genders (that the gender 'science' department are inventing), Chinese Researchers are publishing work in humans that we would've hoped Veterinary Science departments were pioneering. A good example of this might be 'He Jiankui' in China who has claimed to have used Crispr-Cas9 to change the DNA of human babies and make them HIV resistant. Genetic Engineering is probably the easiest way to end the human race (see the chapter in this report on the topic) and end of the world horror movie scripts are writing themselves while Western Universities that could save us from this unfolding disaster have had a small minority police themselves into inaction.

Major brands in the HorseRacing industry are under pressure to accept expensive solutions to counter 'fake' animal welfare issues because public opinions are increasingly being shaped by the media for which it is more profitable to tell a narrative to 'disneyfied' minds that ignores the real world and pretends that the world's most valuable animals that are receiving the highest standards of welfare are being "abused". Pandering to this is like feeding crocodiles in the hope that they won't eventually want to eat you but using tech to communicate effectively and leverage networks is the only viable means of countering these attacks on the industry.

The ability to provide Consent: this has massive upsides for innovation eg. a horse owner can put a smoke alarm, CCTV and Continuous Intercom in a stable to mind their horse but would be jailed if they did the same on their parents!

Anti-Ageing Medicine: while hugely promising most of the companies in this sector would be regarded as little more than a 'con job' by any experienced equestrian who looked into the details. While the American Academy of Anti-Ageing Medicine stands out with it's ethics/standards and partnerships with the Royal College of General Practitioners etc the industry on the whole is plagued by unregulated charlatans who capitalise on fear amongst the elderly and Patients who are vulnerable because they have entered a disease state and want more than anything to be given some hope. As Consultant

Paediatrician Professor Sam Lingam explains in the 'Longevity and Anti-Ageing' chapter of this report: The most exciting opportunity for the validation of anti-ageing medicines is in the period of life where the most ageing occurs which is most obviously in youth (and maintaining this state). The medico legal and ethical prospects of trying to do that in the human market unfortunately make it a completely non-viable opportunity for validation of research.



Science has evolved from a hobby/religious activity into a career/way to make money:

With the collapse of religions there has been an explosion in the amount of people with careers in science. As a discipline it has evolved from something where we try and understand the world God has created for us and has now become something that millions of affluent people do for a career (and to support their lifestyle and ego). This is fundamentally undermining the value of published science and creating lucrative feedback loops that incentivises us to expand



Register today at HorseTechConference.com to join us for the FREE livestream

the workforce and continually promote accepted scientific thinking.

So many Patients feel reassured by the idea of being treated with the latest 'Peer Reviewed Evidence based medicine' without thinking that this really means 'Consensus based medicine'. Behind those countless peer reviewed papers it's clear that there are billions being spent by drug companies because they realise that the spend is effectively a marketing budget (as they get to produce bias confirming papers that their sales representatives can then use as powerful adverts to push under the noses of medics and hospital administrators).

In many ways the equine market could be viewed as a situation of optimum freedom that is unfortunate for reasons (imagine if they had access to the talent pools and resources of major universities) but positive for others (as HorseTech is being developed today in an environment that resembles more innovative times in history like the early 19th Century when the major Universities were Church controlled and as a result interesting research had to be funded by patrons, gentleman scholars and enthusiastic amateurs).

Defensive Medicine: The law has made incredible steps to kill medical innovation and evolution because lawyers make everyone have to 'go by the book' and created a focus on 'prescribing bibles' that essentially make clinicians decide things according to the manual rather than developing their own good sense. The reality is the human body is far too complex for this paint by numbers approach and following it is fatal to the creative innovative minds of intelligent medics.

Doctors will often come to learn that the set of particular facts that they have to accept to practice conventional medicine are fake. Unfortunately too many of them only realise this at a point in their career when they have a secure salaried job that's starting to pay off their student debts, a mortgage and children going to school etc. Rejecting the lies would be too expensive for the lives they've worked so hard to create and so we see them lead with pills and procedures rather than food, exercise, relationships, self-awareness and being productive.



Kerry M Thomas,
THT Bloodstock

Physical efficiency and soundness in the horse is only part of the requirement to compete at the highest levels. Stress management and the ability to adapt to sudden changes in the environment independently are essential. The psychological athlete must be efficient and sound in order to optimise physical talent.

Since the Horse's DNA was mapped there has been a growing interest in behavioural genetics because up and until recently it's only been possible to just sense inherited behaviours. In the past Equestrians with expertise and experience could have great success because so many behaviours are influenced by genetics but there are now technological advances that enable the genome to be searched, predicted and even modified without having to wait until a horse matures and personality develops. Countless genes and environmental factors influence behaviour and we're only starting to develop scientific approaches.

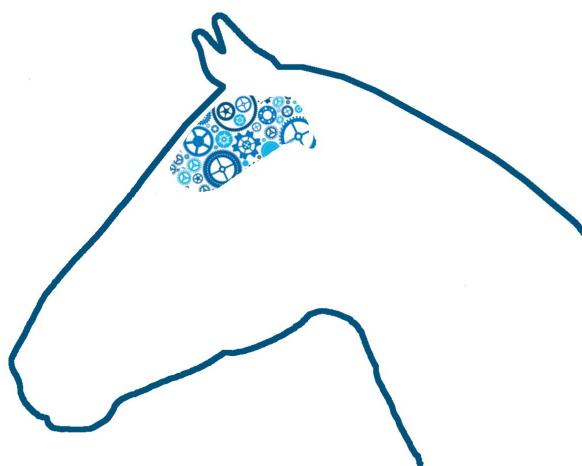
Accurate evaluation of emotional intelligence and herd dynamic level enables better understanding and analysis of the mind of the race horse, as it relates to class, distance aptitude, performance and breeding. By juxtaposing information including a horse's behavioural genetic profile, tendencies and herd dynamics together with a horses' physical and pedigree information specialist companies like THT Bloodstock, a full service book stock company based in Pennsylvania founded by Kerry M Thomas, offer strategic value to clients enabling them to 'invest in both the car and the driver'.

Many areas of horse psychology are too often under appreciated and exciting HorseTech opportunities lie in accurately uncovering these and using them to make better decisions because psychology plays a vital role in the

PSYCHOLOGY (BEHAVIOURAL/MENTAL PROFILING)

development of an efficient and high-functioning sensory system.

The psyche plays such a major role in every aspect of the horse's life from the natural placement in a herd of their peers to the way they manage the emotional stress of training and competing. Rapidly identifying character and behaviour traits, strengths and weaknesses and mapping them to comparative data sets help to reveal inherent environmental dependencies of individual horses and this has big upsides as patterns in



behavior translate to patterns in movement: vital insights that should contribute to not only purchasing decisions but also for developing customised training programs.

Herd Dynamic Profiling provides unique insights into the psychology of the horse which enable applications at every level and at every stage of a horse's growth and development. Whether used in identifying likely growth patterns in the very young to matching proper character traits and stress tendencies in potential breeding mates, or providing performance profiles for competing horses, herd dynamics is next level innovation.

On an individual basis the sensory system leads the way in controlling physical

movement and within a herd setting it is a determining factor of where the individual ranks in herd hierarchy influencing where they "finish" when competing against their peers.

By nature 85% of horses fall into the middle ranges of the herd dynamic hierarchy, meaning they have inherent inefficiencies in their psychology which translate necessarily to dependencies within the environment, namely other horses. These dependencies influence movement, superseding physical aptitude; the ability to interpret stimuli precedes and dictates the resulting movement, thus affecting the horse's ability to compete on a sustainable level.

The higher you go on the herd dynamic scale the more independent the horse is psychologically, and subsequently the more sensory sound and adaptable to situational chaos. Horses with hidden herd dependencies are prone to becoming "herd bound" and have difficulty in separating themselves from the

herd and when they do, they have a far more difficult time sustaining this separation. There is a major difference between a horse moving in space, and a horse moving through space.

Elite herd dynamic ability horses are a very low number by percentage, in any given environment you will find 3% or less at this level. Matching physical potential with psychological potential in the selection process is the key to recruiting higher and finding that next-level prospect.

For centuries the equine industry has been managed via legacy paper based systems but in 2018 an international digitalized platform is almost a mandate if any industry wants to evolve. The lack of a digital Equine Registry platform (compiling the information on the identities, characteristics, medical records, movement, location and other important information) makes it impossible to swiftly access reliable information.

THT Bloodstock

"A horse lives by the laws of their nature. Where they fit in to the herd, how they interpret their world, how they learn, how they're coached, how they ultimately perform, is governed by the rules of that nature; it is wise to make an effort, to understand it." #HerdDynamics Matter. ~ Kerry M Thomas

Home About THT ▾ Our Team Services Big Race Analysis Runhappy Blog Links Contact Triple R Gold

Welcome to THT!

THT is the only company in the world that specializes in analyzing the mind of the racehorse as it relates to class, distance aptitude, performance and breeding. Get an edge on the competition by incorporating Kerry Thomas' groundbreaking herd dynamic research into your program. *A few notable horses include Breeder's Cup Champions Runhappy & City Of Light who also won the 2019 Pegasus World Cup, Beauty Generation, and Horse Of Racing Age selection, Fielder

[Replay the lecture Kerry M Thomas gave at the HorseTech Conference 2022 in Cheltenham by visiting \[HorseTechConference.com\]\(https://www.horsetechconference.com\)](#)



Philip Carberry,
Business
Development,
MustangChain.io

Tech offers the opportunity to remove bureaucratic, time consuming, passion killing processes that prevent rapid decision making. Consumers won't wait 10 seconds for a web page to load but today when someone requests equine documentation on the pedigree, medical history, or any other documented variable on a specific horse we shouldn't have to rely on paper based systems. When we move beyond these we also enable the industry to do more international trade and move beyond today's fragmented local and regional structures. It's not hard to imagine the potential additional growth in the already booming Asian and Middle Eastern markets if international digital platforms can unite stakeholders and facilitate trade in this fragmented industry.

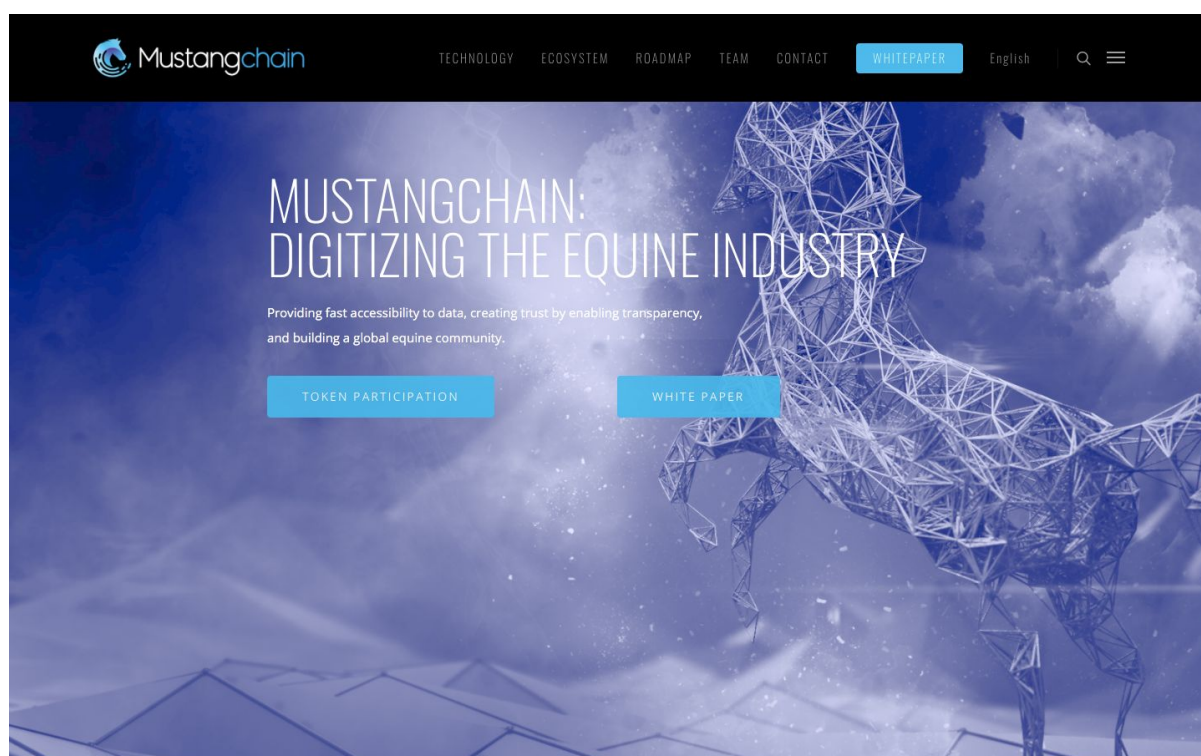
We are currently on the verge of the 4th industrial revolution, with new and upcoming blockchain-Internet of Things (IoT) solutions penetrating all industries across the world. These will help bring about a new sharing

economy whereby interconnected communities enabled by trust can supplant centralized corporate institutions and will determine the growth trajectory of industries.

Equine industry stakeholders need to work collaboratively to leverage blockchain and IoT solutions to create a digitalised Equine Industry fit for the future. Equestrians need the ability to biometrically identify equines, to swiftly

authenticate the validity of their passports and documentation and draw actionable insights from their important data. An immutable state of the art blockchain ledger with all with the transparency and data accessibility that is needed to enable trust and reputations to be built and to drive out fraud.

MustangChain is providing the resources to support the equine ecosystem to share data and resources and will enable the community to build decentralized apps on the MustangChain platform that bring together all stakeholders in a one-stop platform to trade, exchange, and learn.



Here we wanted to talk specifically about our verification and authentication function we are building, since it will be the cornerstone of the platform; a system by which all equine data can be recorded onto an immutable state of the art blockchain ledger. This digitalization of equine data will enable fast accessibility of data but also facilitate international equine trade by clustering this information on a platform that's securely accessible from anywhere.

The emergence of 'big data' will be a driver for unimaginable Equine Welfare advances as data becomes accessible for analysis and advancement of scientific and entrepreneurial endeavours.

Market research by MustangChain makes it clear it's only a matter of time before Equine imaging (probably eye scan identification initially) is shown to be superior to microchipping in terms of reliability, equine safety and feasibility. Millions of people already use such tech to secure and unlock their mobile phones and the latest smartphones do this by projecting grids of +30,000 infrared dots onto the users face and then reading the pattern to generate a 3D facial map which is processed by a system that learns from changes in a user's face over time, and can therefore successfully recognize the owner while wearing glasses, hats, scarves, makeup, etc.

Huge opportunities emerge as we replace the current paper passports with new tech enabled solutions. By assigning blockchain identities to stakeholders who have legal responsibilities for and/or are involved in their medical care we create opportunities to ensure all stakeholders that are involved in the medical care or have legal responsibilities for a horse can immutably read and write to it's identity. Studbooks will use the data record as a means of keeping track of all registrations. Veterinarians will be able to add medical

information to the data records. The horse owner will have to approve and sign any future transactions such as sale to a new owner, registry at a different studbook, or whenever a new vet is appointed to the horse.

Establishing more transparency is a major catalyst for growth and entrepreneurial endeavours. As the equestrian sport is evolving and growing at a fast pace, there is an increasing need for systems and platforms that can ensure transparency, reliability, and quality control. For equestrian sports to evolve beyond today's narrow regional niches and expand into a international network where more and more people have access to this beautiful sport, it is mandatory to use the latest tech to create a reliable and fraud-proof decentralized system where stakeholders can verify identities, authenticate equine passports, and consult important equine data fast and efficiently.



Mustangchain



Dr Barbara Blasko,
Founder,
Electronic Vet

VACCINE RECORDS

Vaccinations and vaccination records are common terms when discussing animals, especially in terms of travel. Whether being transported for slaughter, competition or fun, vaccination records are necessary to help reduce the risk of disease outbreak. Currently, vaccination records are produced on paper, whether typed and then printed or hand written. Either way, the documents are not secure.

This problem is especially relevant for competing equestrians required to produce proof of negative Coggins test, health certificate and vaccination records in compliance with USEF, State and competition regulations prior to entry. Each farm manager currently has his/her own method for managing and producing said equine medical documents, most opting for the three ring binder complete with sleeves. Should this binder be lost or tampered with, replacement can cost money and time alongside denied entry into a State of competition. Why are these vital records not digitally recorded and housed?

For decades the United States Equestrian Federation (USEF) allowed States and competition venues to be the authority for equine vaccination requirements and means for verification of vaccination. Thereby, depending on where one traveled, vaccination requirements changed or were not required leaving the only required information to be presented for competition: Coggins test and health certificate. This hands-off approach coupled with bad record keeping resulted in

over vaccination, as well as inevitable disease outbreaks.

In 2015, as a response to these issues and Statewide outbreaks of Equine Influenza Virus (EVI) and Equine Herpesvirus (EHV), the USEF passed into law a requirement that any horse competing in the U.S. at a USEF sanctioned competition must have been vaccinated against EIV and EHV within 180 days (usef.org). This became known as The Equine Vaccination Rule (GR 845). Proof of vaccination is required,



alongside the other two health documents, to gain access to the competition venue. This law has proven to create continuity of vaccination practice and reduced outbreaks.

The practice has been streamlined and resulted in increased biosecurity at each venue, let alone competition of any level, but does not extend to suggest or require a method to produce biosecurity documents. As such, most documents are produced in paper. The issues with paper documentation are limitless, but germane to the discussion, the issues directly are two-fold: Fabrication and liability.

It is more common, on the USEF competition circuit, to fabricate/forged health certificates than Coggins tests and/or Vaccination records, but the notion that one can be easily forged exposes the vulnerability of all three documents. The process of forgery of health certificates is not done without compliance of many parties, often including the vet. Considering the cost and time of a vet visit, coupled with the need to produce new health certificates and vaccination records multiple times per year depending on how much one shows, it is much easier to have the vet leave the signed document undated and allow the owner to date the document whenever necessary for travel. Or using old school white-out and a scanner, the job can be done in a flash. Knowing this, has the new law actually reduced the risk of outbreak? Probably not. The implications of a forged equine medical document has a ripple effect that impacts competitions and other equines.

Should an outbreak occur during a competition, the competition facility is liable for containing the outbreak with a lockdown or quarantine area. This closes off any potentially infected from others to attempt to contain the issue. This is immediately costly and dangerous. It can also hinder future success of the venue. With the recent outbreak in California, competitions at that venue, as well as others in close proximity, saw a reduce in numbers. Equestrians try to stay away from possible outbreak areas, as well as competitions that can be seen as lax on biosecurity, for the sake of the competition year and the health of their equines.

By including technology into day-to-day equine management and veterinary practices, it is possible to suggest that documents, especially medical, can be stored and produced in a digital, verifiable and seamless manner. Electronic Vet, LLC ("eVet") is one possible solution to this issue. Barbara Blasko, MD, founder of eVet, is a lifelong equestrian

and a practicing Emergency Medicine Physician. She has been on the forefront of technological innovation in the human space. It was her experience that allowed her to see the eVet solution and create the online platform for safe, secure and simple show complaint equine vaccination certificate, an "eVet Certificate".

eVet allows users to store equine records, such as Coggins and health certificates, on a secure platform. It also allows verified veterinarians to input vaccination information on a given horse allowing the user to create a show compliant vaccination record called an "eVet Certificate". This document can be submitted digitally to competitions and/or accessed by anyone (trainer, rider, owner, vet) connected to that horse. Any information input by a vet is not able to be edited or manipulated. This process makes the platform HIPAA and USEF GR 845 compliant and makes losing information or fabricating documents virtually impossible.

While currently eVet's focus is on show compliant medical records, specifically show compliant vaccination records, the eVet platform and its basic function to digitally store equine medical records and create vaccination records is necessary to solve problems with animal transport in general. With the rise of companion animals traveling as support animals and the general health of the livestock industry, digital records can help ensure smooth transport, verify records and reduce liability that comes with paper record keeping.



Visit ElectronicVet.com

ENVIRONMENTAL & WASTE MANAGEMENT



Shelly Townsend,
Inventor/CEO,
Equine Eco Green

The latest tech advances offer solutions to the enormous waste disposal, environmental and economic challenges facing the equine industry, they also provide enormous potential to advance equine health and enhance the reputation of the equine industry.

Waste disposal is a worldwide ecological obstacle. Today recycling, reclaiming, green, and environmentalism are all on the frontline of mainstream media focus. Environmentally sound and economic waste disposal and quality bedding are daily challenges for every horse trainer, rider, breeder, owner, and any large venue in the sport of racing and equestrian competitions.

With the average horse producing about 50lbs of manure a day large equestrian businesses, racetracks and horse shows can be producing over 100,000 tonnes annually and this creates significant ongoing issues as to what to do with equine waste and where to dispose of the material properly and this is a problem that is increasingly going to be a challenge due to rising populations and real estate value increases.

Equine waste is a real problem that eventually leads to far reaching environmental damages and the industry is increasingly seeing serious environmental issues and lawsuits now hitting the horse industry that historically were more typically targeted towards poultry, hog, and cow waste.

High profile public cases and the publicity they generate highlight the need for the equestrian industry governing bodies to show leadership. These include Suffolk Downs incurred \$5M in

United States Environmental Protection Agency (EPA) fines, \$1.25M in civil penalties, and spent more than \$3M to correct and manage their waste in Boston, Massachusetts, an equestrian facility in San Juan Capistrano, California is in a lawsuit regarding damages incurred to the waterways in Orange County, Gulfstream Park (home of the Florida Derby and Pegasus World Cup Invitational) received a \$456,000 EPA civil penalty for discharging pollutants in an unauthorized canal, Tryon International Equestrian Center (home of the 2018 WEG) had a petition with 553 signatures claiming horse waste was ruining the area and demanding removal/relocation of the compost facility established to manage the waste produced during events, Palm Beach County, Florida is constantly in a battle regarding waste produced during the world renowned, long running show and polo season that during the winter of 2018 during the Wellington Equestrian Festival plagues the community with an

unresolved mysterious stench that somehow disappeared after the season ended, the 2016 blue green algae crisis was disastrous for the state of Florida and a major contributor was pollutants and runoff from agriculture. Horse waste spread near and by canals that feed main waterways is also a contributing factor. When droughts occur in Florida it's the perfect setup for disaster. Sudden rainfalls combined with other agricultural and equine wastes that remain uncorrected can once again trigger algae blooms. This has been evidenced by a recurrence in 2018. Besides from the environmental impact there are catastrophic economic damages to fishing and hospitality industries.

Fortunately, equine waste disposal has an environmental solution and most equestrians value the idea of an economical green equine



waste reprocessing solution to equine waste management, equine bedding, and alternative products all produced from yesterday's problem.

Equine bedding is used for comfort and to absorb urine. As a result, it contains contaminants and pharmaceuticals. The wood shavings are high in carbon, and the manure and urine contain phosphates and nitrates. Unprocessed carbon (wood bedding) applied to land can deplete soils of nitrates causing deficiency in crops if not properly composted. The wood bedding ties up nitrogen in soil through microbial immobilisation. Raw land applied manure (unprocessed manure) destroys beneficial microbes. Composting the wood shavings and manure combination is time consuming and produces lesser quality compost product versus composted pure manure due to the high carbon content of the wood shavings. Another complication from composting is the sheer magnitude of the materials produced and having enough end use consumers for the compost product.

Groundwater contamination is the result of improperly stored and/or raw land applied

equine waste as it will leach into aquifers. Odours, insect breeding and disease are also a problem. Pharmaceuticals that remain in equine waste will not breakdown without proper composting and are hazardous to water resources. In mass quantities, equine waste is no different than human waste and poses threats if improperly handled and processed. In the USA the Clean Water Act applies to Concentrated Animal Feeding Operations (CAFOs) which are facilities where large numbers of poultry, swine, cattle or other animal types are confined within a much smaller area than traditional pasture operations. An equestrian facility that confines 150 or more horses for at least 45 days in a 12-month period, are classified as CAFOs, and are required to obtain a permit under the Clean Water Act.

EPA data show failures to properly manage manure and wastewater at CAFOs can negatively impinge on the environment and public health. Manure and wastewater have the potential to contribute pollutants such as: nitrogen and phosphorus, organic matter, sediments, pathogens, heavy metals,



1) EEG™ bedding is economical, recycled bedding that is sanitized, sterilized, free of dust, allergens, phenols, harsh odors, and carcinogens making it better than harvested straw or shavings, and even safe for small animals. The bedding composition is unchanged and the absorption is improved.

2) EEG™ soil amendment is processed by separating the wood, hay and manure to produce a higher quality compost. Removing excess carbon creates a finished product that builds soil reserves, improves water-holding capacities and structure stability, stimulates microbial growth, and increases water infiltration rates and root penetration. Organic nutrient rich soil amendment that is suitable for landscapers, farmers, gardeners, nurseries, and polo fields.

3) EEG™ fire logs and starters, pellets, and briquettes have 2-3x more energy, burn hotter and cleaner, contain no additives and 50% less pollutants, less ash, less creosote, less carbon, safe to cook over, and reduce fossil fuel consumption



hormones and ammonia, to the environment. The environmental affects resulting from mismanagement of wastes

include excess nutrients in water (such as nitrogen and phosphorus), which can contribute to low levels of dissolved oxygen (fish kills) and decomposing organic matter that can contribute to toxic algal blooms. Contamination from runoff or lagoon leakage can degrade water resources and can contribute to illness by exposing people to wastes and pathogens in their drinking water. Dust and odours can contribute to respiratory problems in workers and nearby residents.

When contaminants from animal waste seep into underground sources of drinking water, the amount of nitrate in the ground water supply can reach unhealthy levels. Infants up to three months of age are particularly susceptible to high nitrate levels and may develop Blue Baby Syndrome (methemoglobinemia), an often-fatal blood disorder. The microorganisms found in animal wastes, such as cryptosporidium, can also pose significant public health threats. For example, after a severe rainstorm in 1993, an outbreak of cryptosporidium occurred in Milwaukee, Wisconsin USA. The drinking water supply caused 100 deaths and sickened 430,000 people.

If the presence of these microorganisms exceeds the standards set by the Safe Drinking Water Act, community and private well owners not only face health risks, but also have to find new sources for their drinking water supplies. This can be extremely costly and impractical. Damages can extend well beyond human health matters. Man made environmental problems can adversely affect aquatic and marine life, wildlife, and all domestic animals. Agricultural waste presents dangers to all living beings and can even have a negative effect on crops and the ozone, which can reduce agricultural yields and make plants

more vulnerable to disease. Emissions from AFOs (Animal Feedlot Operations (defined by size and discharge)), are a major

concern in areas, such as the San Joaquin Valley and California's South Coast, where ozone and particulate matter often exceed national health standards.

Odorous and potentially toxic gases, such as sulphur dioxide, produced by the decomposition of animal wastes, may also cause nausea, headaches, and throat and eye irritation after prolonged exposure. Methane emissions from waste decomposition at AFOs also contribute to climate change. Nitrogen found in waste, when combined with oxygen forms nitrates that can be reduced to nitrites that react with amines to form carcinogenic nitrosamines.

Recycling tech innovations are setting a new standards in renewable resources for wood and straw bedding and firms such as Equine Eco Green® have developed new ways for the equine industry to manage waste and source bedding materials with patented processes that can enable reclaiming and recycling of stall waste into multiple viable quality products that save horsemen money, protect waterways and reduce environmental pollution to help provide equine athletes with a competitive edge.

Shavings/straw are recycled to provide a more economical, cleaner, dust/allergen free, sanitized and safer quality bedding for horses, Manure is processed into nutrient rich compost for use in organic applications, for polluted properties the making of Fire logs/pellets/briquettes provides a perfect remedial solution and the enhancement of environmental security assures facilities that the water their horses are consuming is safe and clean. By recycling locally large equestrian facilities that import supplies can also reduce costs substantially on transportation.

WEARABLES



Jeffrey Schab,
Founder & CEO,
Protequus

The shelves of electronics stores are heaving with shiny new Fitness trackers that are emblazoned with optimistic promises of how they'll improve your life and turn you into the person of your

dreams.

Smart Clothing, smart eyewear, smart headphones, smart hearing aids, and even smart sensor embedded band-aids and pills. Sadly for investors most of this wearable tech is either being returned or abandoned as soon as the initial 'shiny new toy' optimism wears off.

The optimistic Venture Capitalists who have been backing wearable startups have so far written off billions because while they've been sold on the potential to collect data they consistently fail to understand the what next: what actionable steps can we take when we've got it. Customers don't just lose interest in the shiny new thing, they abandon wearable tech because they find they lack the will power and the ability to make the behavioral modifications being recommended. It's always going to be far easier to buy a wearable or toss it into a drawer than it is to start changing your behaviour and actually exercising more or eating better.

Information collected by wearables doesn't have much effect on human behaviour because we've already got more than enough information to have the basic idea and outside of elite athletes most of us lack the ability to follow through on our intentions eg. cigarette packs emblazoned with 'smoking kills' messages haven't stopped smokers, leaflets on compounding interest don't make people save more money, the number on your weigh scale won't get you to

use your gym membership, etc, etc.

Self directed care is challenging because the human brain is biologically trained to avoid using information to help us choose healthier options if they aren't more comfortable or enjoyable. The health opportunity for wearables is also greatly challenged by today's need to interact with technology. Often these interactions may be small, seemingly simple, easy and convenient steps such as strapping a watch to your wrist, changing a battery or remembering to pair a device with your smartphone (especially if you're a VC hearing the pitch from an enthusiastic wearable tech startup founder!) but they collectively undermine the potential value of wearable technology to work for us.

Philippe Kahn (the pioneering inventor of the cameraphone, wearable tech like fitness



trackers and the SleepTracker™ - the world's best selling sleep monitor) who presented at the inaugural HorseTech Conference at the Royal Veterinary College has explained how the industry is moving towards infinite battery life and negligible form factors. In the meantime the market is fundamentally incapable of delivering on the various alluring promises. Wearables for horses offer a completely different opportunity that is present and workable today with the technology that we have. Far from the frenzy of hype and funding it's an area that's not at all obvious to non-equestrians (and sadly most tech investors fall into this category) but early signs for the transformational potential can be found from a basic understanding of the major welfare needs of horses and the pain points encountered by equestrians.

A Horse's basic wearable needs

Despite their formidable size and power, horses are fragile animals that tend to fall ill and die prematurely of undetected disorders, diseases and self-inflicted injuries that are incurred even when in the safety of their own stall. The number one cause of death in adult horses is colic, it's the primary reason for emergency medical intervention and approximately 10% of the equine population suffers from colic each year. Colic tends to strike in the middle of the night when the horse is left unattended. In the EU and US alone there are 1.7 million cases of colic reported every year, of which 7% will face life threatening complications. The value of the horses that lost to colic in the USA is assessed at \$70 million/year with the total combined cost to the industry for the EU and U.S.A. estimated at \$360 million/year.

Currently there are no effective monitoring solutions on the market to protect the welfare of horses and provide peace of mind and reassurance to horse owners. Horse owners and caregivers are unable to monitor the

wellness of their horse 24x7 and the only way to monitor horses today is the age old process involving regular visits and routine veterinary inspection schedules. This is not ideal as it is generally accepted that most equine disorders and diseases can be successfully treated if early veterinary intervention is sought. There are also major workforce challenges that tech can help us manage eg. 90% of Equine Vets care for less than 10% of the world's Horses and most horses are lucky to get to spend any time in the proximity of a qualified and experienced Veterinarian.

For a horse owner or veterinarian the most obvious benefit of a wearable initially arises from the ability to monitor a horse's well-being 24x7 in real time and automatically initiate alerts and draw accurate insights into clinical care processes, nutrition and exercise. With less than 6 hours for a Veterinarian to diagnose the seriousness of a colic attack early medical intervention is crucial to survival in cases of colic. With a colic attack potentially leading to an operation costing between \$5-12,000 (plus post-op hospital and medical charges) there are also substantial financial incentives to encourage uptake of wearables that are capable of helping prevent and better manage attacks.

Read the imaging, ophthalmology, cardiology, horse-side diagnosis, and respiratory chapters of this report and it's abundantly clear. Horses are constantly radiating information that we ignore until one day we notice something doesn't feel right or discover that something has gone very wrong. Then we start thinking about what we might be doing wrong or could be doing better and then we consider whether we should call a Vet to visit. A horse's failing health is more often than not its way of communicating to you that "I need you to take more care of me". Seamlessly connected data capturing devices allow us to transform how we care for horses and deliver them care. In the future our horses will

Biometrics.
View real time & historical changes in heart rate & respiration

EDI® Score.
View real time & historical changes in overall health & wellbeing

Insight.
View real time & historical data
Artificial intelligence for precision
WiFi & cellular enabled

Activity Index.
View real time & historical changes in activity level

Safety.
Breakaway halter
1" triple-stitched
All-natural leather
Stainless steel hardware
FCC, IC, PTCRB, IEC/UL
certification

Comfort.
Padded crown & noseband
Adjustable chin option
Rolled throatlatch
Finished edges

Made for you.

Made for horses.

communicate to us before we notice they need more care and it will come as suggestions on our mobiles for what we need to be doing for our horses.

An Equestrian's basic wearable needs

It's important to appreciate the complex emotional relationship between humans and horses. A snapshot of this was captured in a recent American Horse Publications Equine Industry Survey in which respondents (predominantly female) were most likely to regard their horses as family members (67%), companion animals (63%), performance partners (58%) and/or best friends (56%). A smaller percentage of respondents viewed their horses as an investment (22%), livestock animal (21%) or employee (8%).

Contrast the lack of connectivity and communication that our horses have with the connectivity revolution that citizens have had since the mobile revolution. 7 billion citizens have a mobile subscription, that's every single economically viable adult with at least one mobile yet the world's most invaluable horses still don't have even basic connectivity to aid them. Wearable tech is going to change all this and provide equestrians with apps that will in real time alert us to do things and help us optimise how we care for our horses. What's more the tech, processing power and software is going to make it no more complex than using an app to do your shopping or organising travel.

The internet is transforming from something we navigate into something that connects things. For equestrians the things that are important are first and foremost their horses wellness, their equipment and stables. Imagine your mobile phone or Apple Watch alerting you and your vet that your horse is colicing, stall cast or foaling. The horse's activity tracker on your app shows that your horse isn't acting normally and perhaps why eg. there's been a loud noise, a fire detected in your barn, or your horse has suddenly started panicking for another reason. Imagine being able to press a button on your phone and watch live CCTV from your stables.

The idea of monitoring horse health conditions isn't new but it's normally very expensive and administered by Veterinarians who are directly evaluating horses for medical or exercise performance reasons. To get results is complex and involved the processing of lots of data (usually from multiple horses for comparison) and requires expensive hardware and sophisticated analytical software. Another approach comes from startups that are selling consumer-grade wearable devices for horses that are left on their own or for use by riders during training sessions. Research for the HorseTech Market Report supplement found more than 100 wearable devices for horses that are under development or have been recently launched. These devices are all very promising and are starting to make possible things equestrians could only dream of a few years ago. Unfortunately many rely on a

potentially dangerous halter or collar to mount the device on a horse.

Equestrians typically think of technology as something that separates them from their horses because we see youngsters glued to screens but discreet wearable tech offers the potential for us to expand our equestrian skills: Imagine what you would do if you had tech that empowered you to be capable of always sensing what your horse was feeling even when you weren't with her. Imagine you had data captured continuously from your horse and processed by scientifically developed algorithms so that you knew that your horse's heart was beating normally, that your horse was breathing normally, that your horse was sleeping & eating normally and that your horse wasn't stressed. AND when it wasn't you were notified and given advice on what you can do to correct it.

There are obvious basic sensing opportunities eg. things like temperature and GPS location sensors that can make you a better caretaker and ensure you know your horse is properly rugged/stabled and is within his paddock but by analysing additional sensor info over time you can find ways to continuously optimise your horses. Imagine having easy to use tools at your fingertips that make it possible to predict the good and the bad days so you can sync it with competition schedules and know when to rest so that you avoid the harms of disrupted sleep and overtraining. Imagine the potential for this to accurately identify for breeders the most fertile time in a mare's cycle? When you read Kerry Thomas's Psychology chapter in this report and think about the potential of this sensing opportunity it's clear this is probably the most exciting area for anyone to work if they want to really understand their horse and optimise its performance.

Legal implications of tracking People Vs Animals.

Societal megatrends like the ageing independently-living affluent populations are exciting investors in the wearable medical market but there are major issues that arise when you enable tracking. Major NHS Trusts gave up on even providing a basic connected glucometer to Patients with Diabetes after the increased data transparency caused issues for hospitals that aren't set up to provide for Patients who are outside of their walls. Because Patients couldn't consent to using the device for self care (as it was prescribed by the NHS) it meant the care contract extended into expensive new areas that the hospitals hadn't imagined eg. ambulances had to be despatched and Patients admitted when connected glucometers shared readings outside of normal blood glucose levels and the unexpected costs and extra demand caused a quick cancelling of what was a logical advance.

The Digital Editor for the Economist has predicted that medical wearables will make Patients uninsurable OR kill the human health insurance industry. Why have comprehensive insurance if big data says you don't need it? Why would health insurers not use your data to put your premiums up if the data said you were at risk of long term disability? In the equine insurance market these issues don't exist and instead major insurers are very keen on data collection as it will help equestrians provide better care for their horses and enable insurers to better control costs and eliminate fraud.

Few people have the first idea about the information that the wearable sensors they use are collecting and sharing with third parties. It has been shown that some android smartphones collect and share gigabytes of data about users mostly without them being aware, everything from what they're listening

to where they are and who they are with. Most people can't even imagine how this is being expanded upon with wearables. If you think having your emails hacked is bad imagine having your body hacked? The prospect of big companies knowing more about you than you do is one thing but imagine the scams if your behaviour can be modified?

In reality there isn't really a distinction between medical and fitness/lifestyle sensors but the human medical regulatory authorities are dinosaurs that can't keep up so it's likely we'll continue to see companies trying to craft deceptive language to promise something to customers and guarantee nothing.

Connected wearables enable the creation of new services

Horse owners are more involved in their vocation than just about any other group. Horse ownership defines them. They spend an average of 22 hours a week with their horses. They read equine publications, they use the web, and they are impulse buyers. In the case of horse health information, 90% of horse owners turn to their vet and only 10% to pharma companies.

The above example highlights industry's inability to connect with their end user in real-time- the horse. This applies to food manufacturers, equipment and apparel suppliers and research institutions and regulatory bodies. Industry reports are few and far between and generally contingent on grants or funding from private or public funds.

Equine Insurance Market opportunities

The insurance industry has no idea how much is lost underwriting horses that are victims of foul play. In the USA alone insurers charge at least \$100 Million in annual premiums to insure about \$1 Billion of horse flesh and they pay out somewhere in the region of \$30-\$60

Million in claims. Equine adjusters have indicated that perhaps 5% are bogus, compared with an estimated 10% of all property and casualty insurance claims.

As an example, a former member of the Kentucky State Racing Commission, sued Lloyd's of London after it refused to pay any more than \$1 million for Pelerin, his dead stallion. Lloyd's argued that the \$1.4 million value he was seeking -- not to mention \$10 million in punitive damages he wanted atop that -- was inflated. Lloyds also let him know it was skeptical of his claim that the animal had overdosed on vitamin D solely from its diet.

For the insurance industry and horse owner alike, a wearable that resides on a horse 24x7 that transmits/stores horse data, would act as an impartial adjudicator in case of a claim. For brokers, this can act to incentivise clients by reducing annual insurance premium.

For Equine Vets this can create exciting new business opportunities as instead of waiting to help horses that have fallen sick you can now work in completely new ways to help prevent sickness before it develops.

Summary

We live in exciting times. Technology is coming to aid our horses and provide invaluable reassurance to owners. Seamless collection of highly accurate data from our horses opens up a whole new opportunity to evolve the reactive design of today's Equine Medicine model into a preventative model of care. The companies that have success in this space are not going to just transform the welfare of horses or the experience of being an equestrian but they will help define how the human sickcare industry evolves and have a transformational impact on our society.



The smart halter™

an equine distress & wellness monitor
that might just save your horse's life

- Real-time monitoring
- Automated alerts
- Objective insight



ONE halter.
MULTIPLE horses.
ENDLESS possibilities.

Objective Insight



Heart Rate



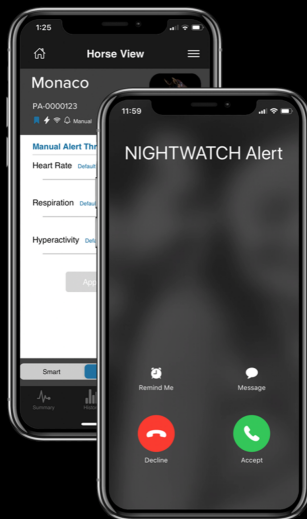
Respiration



Activity



EDI®



Automated Alerts



Text



Call



Email

Forbes

WSJ

FEI

EQUUS

the HORSE

PR
PULLICK REPORT

CHRONICLE
of the HORSE



David Doherty,
Curator, HorseTech
Market Report

"I am sorry, Dave. I am afraid I can't do that" [HAL 9000 in 2001: A Space Odyssey, 1968]

Chatbots and conversational interfaces have always been seen as a fabrication of science fiction until the

world's biggest tech companies went all in on "Artificial Intelligence" or "AI" (in contrast to the tech industry the Equine industry typically uses this abbreviation to refer to Artificial Insemination).

Tech powered Voice Assistants (eg. Apple SIRI, Amazon Echo, Microsoft Azure/Tay, Google Alexa, Samsung's Bixby, etc) feature prominently in the race to add internet connected smart features to everything from mobiles to websites to the speakers in our homes as well as a multitude of other "smart" things such as fridges, cookers, TVs, etc.

Millions of people sit in homes having conversations with things getting them to play music, switch lamps on/off, read news, emails and weather predictions, etc. Even more scary is that millions of us are often completely unaware that their mobiles and smart TVs are eavesdropping on their conversations to create databases for corporations to deliver more effective/profitable ads and enhance their experience using the internet.

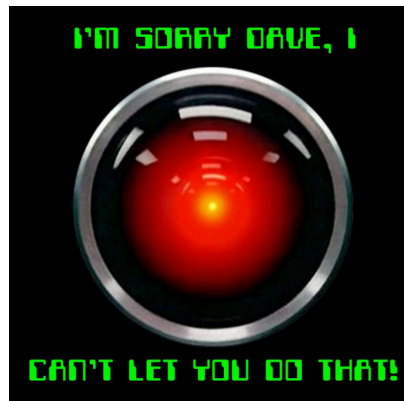
Voice enabled Chatbots have an advantage over the text-based chatbots (that are already ubiquitous and you can see being

used widely on iMessage, FaceBook/Whatsapp, Slack and company support chat lines) because it's far more natural and can enable new applications for equestrians when paired with the latest wireless wearable devices like the Apple AirPods and Aftershokz bone conduction headphones.

> Imagine the potential for devices to listen to our horses and process the data to draw insights into their performance, health and therapies that would help us understand them better and provide bespoke therapies to help them (eg. sound therapy based on sleep studies)?

> Imagine the potential for chatbots utilising Clinical History Taking Questionnaires to help a rider comprehensively document a horses behaviour and record observations to a database so that machine learning can be applied to predict and prevent injuries and optimise recovery.

> Imagine the potential for connected sensors worn by horses to communicate with databases to create action plans that can be pushed to an equestrian's mobile?



WEBSITES & SOCIAL MEDIA



Ashley Neely,
Sales & Marketing,
Bluegrass HorseFeeds

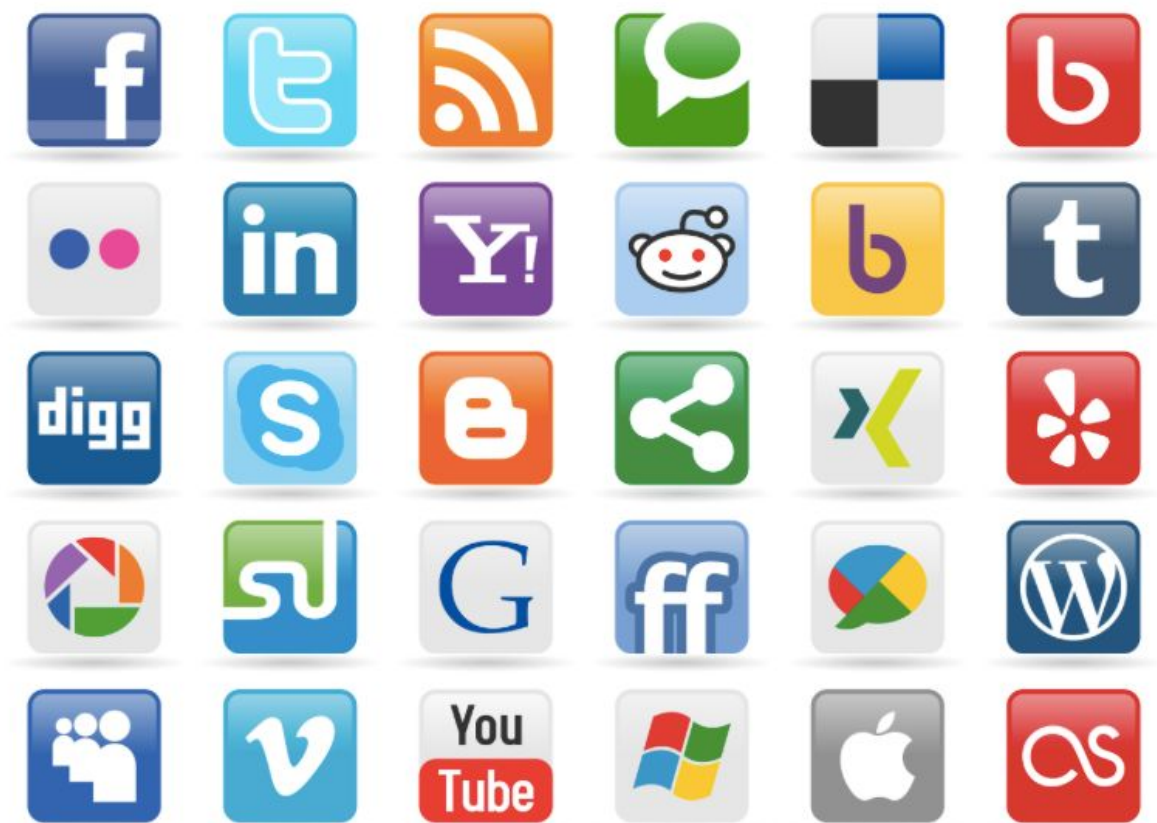
This generation's fast-moving lives demand quick access to information and instant access to breaking news. The days of reading a newspaper are slowly fading away and are being replaced with social media platforms and apps. But how can this impact the equine industry?

The equestrian market is continually growing with an approximate gross output of £4.3 billion per year according to the Equine National Survey. With a growing recognition of the equine industry as a sport, e.g. olympics which has had more media coverage over recent years. Equine businesses can create a strong brand, encouraging non-equestrian consumers and new investors into the market.

There are several social media platforms available that can be used as simple marketing tools to promote products, brands or increase profile awareness. Facebook, being the most popular and commonly know platform has been designed for businesses with the option of a business "like" page. A recent change in

the Facebook algorithm back in February now makes it harder for organic reach to view the content without paying for a post "boost". In basic terms, this means that a post will not be seen by as many followers in comparison to a post that has been paid for. Where other social media platforms have a key targeted audience such as snapchat, Facebook has a greater potential to reach a wider demographic audience.

Recently twitter has become more popular with a growing population of users as a source of quick information on breaking or trending news. Twitter has a short and quick update with a character limit for each post which is different to other platforms and is increasingly used by race courses, trainers and betting companies. Twitter has a wide target reach, especially with its hashtag trending which can be a powerful tool and provide potential for thousands of new followers and interactions. Videos and pictures can have a bigger impression on a consumer than a 500 word blog, again it links back to this fast moving lifestyle and how information needs to be attractive and



accessed quickly. This doesn't require a full-time professional photographer to be hired by each company. A short 30 second video via a high-quality phone camera will likely receive a bigger response than a written post. Videos and pictures have the potential to give followers an insight into their favourite rider, trainer or brand. "Behind the scenes" footage of equestrian events creates a unique and interesting experience for the viewers.

Social media platforms can link with personalised apps, related companies and websites. But, is a good website still important? Websites should be the "focal point" for the company's information, social media posts, brochures and advertisements. This powerful marketing tool takes some practise and skill to use, it is not as easy as social media platforms, however it is an important element and one that the equine industry can benefit from. Search engine optimisation (SEO) basically works as a key for google to find related content. Websites can be tailored to suit the company and target market, for example "one click" buying, live chats or product reviews.

Owners knowledge becomes accessible to everyone via these media channels, inexperienced equine owners can learn off the professionals in a friendly and basic method. With new technologies introduced into the industry continuously, social media and websites are key for promotion and can be stronger marketing tools than an expensive advertisement. With this free accessible information comes a new understanding and responsibility of the equine industry, translating into an improvement of equine welfare. The latest science and research is accessible to everyone which ultimately results in an improvement of equine care and understanding as a whole.

Media coverage of the equine industry is improving, racing has always been the key

sport viewed by the public. Non- equestrians join together every year to watch the prestigious Grand National and with this welfare is the forefront of many viewers minds. Recently videos and photos of horses post the race day enjoying a time off in the field has seen thousands of new followers to these trainers, showing that equine welfare is priority within the industry.

Promotion of a profile or brand via social media platforms has become a vital part of marketing plans. Branded videos and photos are easily edited with editing apps and news can be shared instantly to followers. Exciting new technologies for marketing are continuing to be developed, accessing instant information could become even quicker in the future. The equine industry has the potential to grow even bigger via the incorporation of new technologies and ways of communication. If the industry does not continue to evolve and invest in the future, it will be left behind.

So many companies failed to keep up with the times and where are they now? Don't let the equine industry fall away for lack of a vision. There are plenty of "me-too" brands out there, and as the tech space fills, competitive intelligence will become more important for growth and brand longevity.



Michael Brady,
International Trade
Agent

INTERNATIONAL TRADE

Equestrians are increasingly seeking greater transparency in the value chain and more effective exchanges of information. The next generation have experience of tech like Amazon's

smartphone app that allows you to snap a photo of a product's bar code and see it appear on their doorstep the next day and it's making it unthinkable to even begin to deal with the complexities of doing business for most of us in the equestrian industry.

Sensor Data collected from the equine athlete can now be processed in milliseconds to provide insights into better ways to manage the biological, psychological and environmental needs and well-being of a particular horse but we need to do more to encourage

HorseTech entrepreneurs and investors, and bridge the wide gap that exists today between equine practitioners and tech solution providers.

The usefulness of the knowledge acquired from horses is only as useful as what the end-users can do with the information. Similarly, technologists must comprehend the entire workflow of a stable environment (including the countless non-spoken or documented influences) for an equine-technology successful partnership to reach it's potential. Middle Eastern and Asian Equine enthusiasts are solution seeking a competitive edge in the industry by formulating procurement networks that utilize Information Communication Technology to provide transparency, and increase investment returns.

In Commercial Equine Enterprises intuition will not win out. Successful equine enterprises are

moving toward an existential approach to horse well-being, care and performance by using data to enhance decision making processes and maximise on performance potential. Collaboration cannot expand and develop into meaningful end-results if collaboration is conditional. Information Communication Technology is an elasticated roof of added value functioning, that extends cross-border. Cohesiveness in an international network of networks is an open invitation to innovation, and innovators from the international equine interchange markets, such as financiers and legal are merging into hubs

which generate business value.



As an example through the Q1 2018 the South African rand dropped 10% against the US\$ and this coupled with Indians seeking to purchase stallions for their growing market has created new

opportunities to drive business value by reducing legal costs with soft functions such as Online Dispute Resolution (ODR), which extends the network of networks over quarantine length, information is required for ODR principle stakeholders. Interconnected information-flows from all stakeholders strengthen the value chain and provide adaptors to the network of networks with knowledgeable, powerful benefits.

Streamlining info flows will disrupt the status-quo of the international equine industry. Ultimately a horse-investor will be able to buy shares in a racing horse as it passes furlong markers by simply touching the screen of their smartphone. This will capture the attention of new audiences and make the prospect of ownership a reality for a generation that want sports that have kept pace with the innovations they experience in the rest of their lives.



Paul Jones, Founder,
PJ Copywriting

The importance of copywriting in the HorseTech industry

Like the contributors in this report, you are likely to have created an innovative product or service that can potentially make a difference to horses' lives and the lives of equestrians. But developing that product is only half the battle. If you can't convince audiences of the benefits when they read the content of your marketing materials, or they don't help them understand how your technology solves their problems, it won't sell. It's therefore important to write engaging and informative content that effectively educates and persuades potential clients how your technology can be the right solution for them. This is where copywriting comes in.

What is copywriting?

Copywriting refers to the practice of writing sales or advertising copy to persuade a person or group of people to take a particular action. Often, this involves persuading your reader to buy your product instead of your competitors', but can also mean asking potential customers to contact you for more information or sign up for a free trial. Copywriting encompasses many things including: content for print and online ads; sales letters; advertorials; website content; blogs, articles; product descriptions; whitepapers; and social media posts. In fact, any form of communication with prospective buyers. Although thought of as selling in print (or online), great copywriting must go beyond that and clearly demonstrate that you understand the problems equestrians face and how your technology can help them solve those problems, without coming across as salesy.

The importance of researching your audience

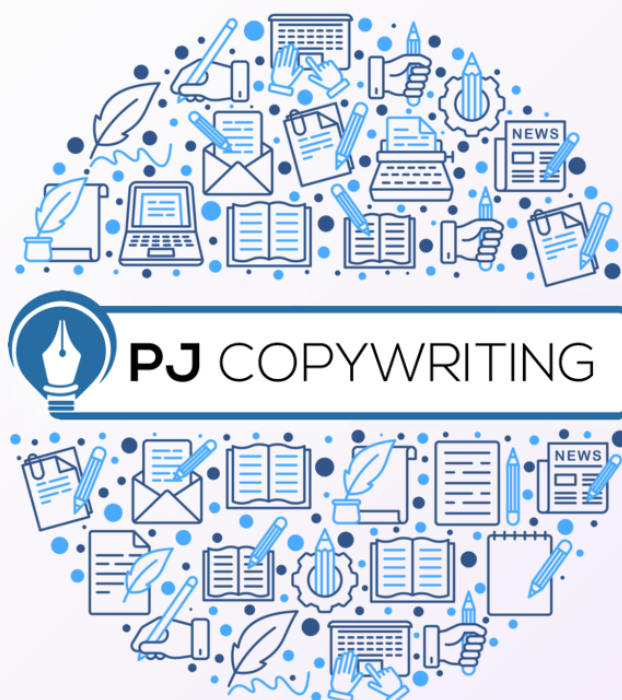
Where you focus your research will largely depend on your product and target market, but whatever your solution is and whoever you're selling to, this is a vital step that can't be skipped. Without conducting research, it will be very difficult to get to know your audience's problems. The equine industry is

COPYWRITING

no exception, which includes diverse audiences ranging from stable owners, breeders, trainers, through to geneticists, veterinarians and therapists - each with their own hopes, aspirations, challenges and fears. Research allows you to gain a deep understanding of them. Once this happens, you'll be able to describe your audience's problems more accurately in your marketing materials and, as a result, be able to persuade them that you have an answer to those problems. Research can also enable you to know the language your audience uses so you can incorporate it in your sales copy, allowing you to establish a connection with them.

Benefits not features

When developing ground-breaking technologies for the equine industry, there is a danger of getting too focused on describing their features and forget to talk about the benefits. At the end of the day, you're not selling a product, you're selling what it does. By highlighting the benefits in your sales copy, you're helping your potential clients quickly determine if your solution can solve their problem. It's therefore important to link each benefit of your product to the challenges faced by your prospect. For example, when promoting water enhancers, don't just describe how ceramic beads (feature) can alter water in a way that can be easily absorbed by the cells of animals such as horses, highlight how



the converted water improves horse health (benefit), or make owners, breeders, and trainers' lives easier.

Always include the most important information first

This is very crucial to success because of Anchoring Bias, which, in a copywriting context, refers to a situation where we rely heavily on the first piece of information we see in sales copy, or other types of marketing material. This initial piece of information then influences our perception of any new information that follows. It's therefore important to start marketing copy with a headline and first paragraph that summarise your solution's strongest selling point, or most important benefit. By doing this, your target audience will have a positive first impression of your product and perceive any new information relating to that product more favourably, persuading them to read the rest of your sales copy. For instance, Equilux's (a contributor to this report) advanced lighting and air conditioning system for stables has many benefits including lower electricity costs and improvement of a horse's alertness in the daytime. But, the company begins its website copy with its most important benefit - the improvement of a horse's health, growth and development.

Write as you speak

When writing content - be it content for your site, blog article, or ad - it's important to avoid formal language or technical jargon as it will only frustrate or confuse readers. All forms of marketing content need to focus on building an emotional connection with potential buyers of your technology and persuading them to take a particular action. This means using conversational language that clearly and concisely communicates your understanding of their problems and your product's ability to solve them. One good method of making sure your marketing content sounds natural is to read it out loud.

Include testimonials

Another important element of copywriting is the need to address any objections that a potential buyer may have when they're deciding to make a purchase. For example, these objections can come in the form of many questions in equestrians' minds, such as how will the technology work? How it will

help me? Has it worked for someone else? One way of addressing these is to include testimonials or reviews from customers who previously used the product, which provide potential buyers both proof and reassurance about its effectiveness. In this age of social media and online reviews, testimonials have become more important than ever before as people tend to trust the opinions of their peers, or existing product users more than company advertising. For example, according to Paul Gillin, author of *The New Influencers*, and a keynote speaker at the New England Direct Marketing Association conference, 78% of consumers trust each other more than advertising. Furthermore, research by Bright Local revealed that 84% trust online reviews so it may be worth encouraging customers who previously bought from you to leave feedback on third-party online review sites.

...and if you have no testimonials

Include positive comments or testimonials that praises your product or expertise on social media on your marketing materials, logos of businesses that have used your product, or logos of relevant equine-related publications where you wrote articles and shared your expertise. In addition, if you tested or carried out research on your technology, share the results. For example, Equilux published research on its site, which revealed a higher Fat Free Mass (FFM) and improved coat condition among horses housed under its lighting system compared to those housed under conventional stable lighting.

Use case studies

Case studies is a useful a storytelling technique that gives you the opportunity to show your technology in action. By writing case studies, you can clearly demonstrate the difference your product has already made to equestrians like them. Case studies can be especially valuable if your technology or solution is complex. Within case studies you can include a detailed account of your existing customer's problem and how your product solved it. You can also add photos to make the case study more memorable, or even make a video case study. For example, one of the contributors to this report, Lipogems Equine has both written and video case studies featured on their site, which gives details of the injury of their clients' horses, and how their innovative stem cell and regenerative medicine has

improved outcomes, and enabled those horses to return to normal riding activities and competitions.

Give a clear call to action

One final element you need to include in your marketing copy is a clear indication as to what you would like your target audience to do next. Is it to contact you by email/phone? Click on button inviting them to order or pre-order your product? Request a demo? Or click on a link to download a report? Whatever form it takes, a call to action is vital in persuading a person to take immediate action. It also gives you an opportunity to summarise your product's benefits again and illustrate how, by taking a specific action, the reader can enjoy those benefits. Call to actions can also be added near the beginning of sales copy after the first paragraph, mentioning your product's most important benefit, or near the top of your website's homepage. For example, Plusvital displays a clickable coupon on the slider section of its homepage, for visitors to get a 20% discount on its Neutragast product.

Offer free content

Chances are many people who visit your site, or read your sales page are not ready to make a purchase. This is especially the case with sophisticated equine technologies, some of which may require significant investment. As a result, potential buyers want access to as much information as possible to decide whether your solution is right for them. Therefore, you need to build trust by providing that information. A great way of building that trust is to offer free content on topics and issues that are close to your customer's heart. This can include a blog on your site and gated content, such as newsletters, e-books and whitepapers, where you ask people to provide their email address in exchange for access. This allows you to build a mailing list of qualified leads. E-books and whitepapers are especially a great way to share your expertise and unique insights on your client's industry and its challenges, the various solutions that out there, and highlight how your technology is best placed to help them address those challenges. For example, if you're a supplier of horse race track surfaces, you might want to write a whitepaper on injury risk factors associated with track surfaces, and how choosing a reputable surface supplier can help

minimise those risks. Or a blog post/e-book on tips on track maintenance and care.

The benefits of hiring a copywriter

Even if you are familiar with all the copywriting techniques above, or you are talented wordsmith, chances are that you are using a variety of channels to communicate with your existing and potential customers. On top of that, you're busy on attending to the other demands of your business. So, finding the time to regularly write content for those channels can be challenging. Apart from freeing up time for you to focus on more important responsibilities, hiring a professional copywriter has many benefits including:

- * Knowledge and experience of writing persuasively and the ability to do so in a way that excites and engages your audiences rather than make them feel pressurised or manipulated.
- * An outside perspective of your company and its products. Hiring a copywriter helps you to keep looking at things from the customer's point of view so that you can describe your technology or solution in terms of benefits to your target audiences, rather than features.
- * The ability to describe complex and technical concepts in a language that audience find simple to understand and gets them enthused. This is especially useful if your horse technology has many moving parts.
- * Helps you make sure your brand's tone-of-voice is consistent across all communication channels whether you're writing a print ad or a social media post.
- * Copywriters can also act as editors and proofreaders to eliminate grammar, spelling, and punctuation errors, and ensure your copy flows well. This will save you time and money in rewrites and reprints.



Amanda MacDonald,
Founder, FullGallop
Communications

The Equestrian industry is full of brands that market their heritage and while this can make it challenging to enter (because it's hard to establish the trust that is validated by years serving customer needs) it offers opportunities for startups that leverage tech in innovative ways and use it to carefully craft and establish a tech focused brand and makes them very attractive for acquisition after developing a sales pipeline.

Branding is critical for new Horse Tech products as it provides a much stronger chance of succeeding in the marketplace, being remembered and trusted by new users and adding value to the overall company when/if you decide to sell after the start-up phase.

New tech brands, in general, tend to focus on the product brand or launch, and forget that the key supporting elements are just as important to sustained growth and building customer trust. A strong company brand sustains a new product line by creating trust in the product and communicating the overall value of selecting your product. It also helps your internal team to align thinking and make better decisions.

Branding is more than your website, app or logo. It's in the intangible elements that make up how people feel about your company and products, and separates the clear winners from the forgotten brands.

Not having a brand remains one of the most common mistakes that tech startups make.

Developing it needs to be one of the first and biggest priorities for your company and you need to take the time and spend the money to do it properly because attempts to build business momentum without one will require much more effort and money.

If you are looking to launch or develop an equestrian technology company there are six key activities that you should focus in order to launch successfully and stay competitive over time:

1) Define your brand- Develop your core identity with competitive and market research

The process of outlining why your company exists and describing why a customer should choose your brand is a step that cannot be skipped. Development of a real brand requires significant effort that includes the elements of competitive research, market research and the creative/visual identity. Definition of the core identity first requires the determination of your brand story and purpose, which then is rolled up into your value proposition. Once those steps are complete, the visual discovery phase begins and is steered by keeping the story, purpose and intended audience top-of-mind. The best creative elements are able to visually define a brand and immediately align them with the correct user group. Your employees

should also be very on board during this stage to align all elements of the company from customer support to finance.

2) Communicate what your brand means - Share your story and purpose with consistent messaging.

A circular watercolor graphic in shades of blue and teal. Inside the circle, the text "Sell the problem you solve, not the product." is written in a dark blue, sans-serif font.

Sell the problem
you solve,
not the product.

(Full Gallop Communications)

Sharing your story and purpose, with a consistent message and voice is crucial to building customer understanding of what it is that you offer. It is easy to stray or come up with ideas that may confuse or dilute what is being said while your

campaign is running. Focus on building emotional connections with your brand, which in turn builds trust and the value of your product and eventually, returning customers. How does your brand make a trainer's day shorter, speed the healing process for an animal or collect data to assist with critical health decisions for a worried owner?

3) Create a strategy your team will get behind - Ensure your brand is first understood by your employees.

Obtain internal buy-in and understanding before sharing with your customer base. Careful selection of channels and placement of message based on customer preferences, your budget, and intended audience will factor into building a successful brand over time. It has been proven that it requires a minimum of seven "touches" before a logo or brand name is understood, and even more to ensure brand recall at a later time. A smart strategy will allow for maximum understanding, targeted at the people you need to reach most. Give it time to work. Memorable brands are not made overnight.

4) Understand your customer wants and needs - Learn where this information lives and how to find it.

Needs and requirements are different when looking at a weekend rider vs an experienced racetrack trainer. Digging in and doing the research, performing surveys and having conversations requires time and effort, but will



unearth the gems to differentiate your brand from the competition. The data collected should be used to elevate and dial in the next product iteration, marketing campaign and customer service support factors. For technology brands especially, knowing

how tech-savvy your customers are (or are not), will make decision-making faster and allow for a better product in the end.

5) Offer better customer experiences - Develop loyalty, use emotional branding to create a community

Those who support, win. Is your product easy to use out of the box or upon installation? Will it require UX evaluation before you can release the next iteration? Take advantage of beta testing and comparative testing stages. Design your brand and products to meet and exceed customer expectations, and you'll both customer satisfaction and brand loyalty.

6) Know where you stand - Develop awareness: How does your brand look in the marketplace?

It is vital to understand how your tech brand stacks up against the competition. Is your brand winning the market share? Are you paying attention to other's message delivery and tactics? Do you follow them on social media? What are others saying about your products? Staying focused on the ways you are unique and the messaging behind those ideas will keep your brand fresh.

There are plenty of "me-too" brands out there, and as the tech space fills, competitive intelligence will become more important for growth and brand longevity.

FOALING MONITORS



Andrea Banchio,
Equine Vet &
Consultant, Sisteck

The secret to breeding the best horses is getting them off to the best possible start and the birth of a foal is arguably the most unique and delicate moment in its life. For the mare, gestation can last anywhere from eleven to

twelve months, and the final period can often be unpredictable and critical: One night or early morning (normally when she has waited to find the most private moment) the magical moment is fulfilled and we hope everyone is ready and things will go smoothly. Unfortunately, statistics teach us that in a good 20% of cases there is a need for urgent help from a veterinarian so that both mare and foal, won't face serious dangers.

Breeding a champion horse is not easy and it's a long journey full of challenges. The main factors to pay attention to include nutrition, health monitoring, exercise and training. From an early age, the specimen needs to be cared for, especially during weaning. The food given should be of high quality and the correct amount of nutrients should be fed to the youngster, which will increase as they grow. Logging of regular observations and health checks are key to learning about a particular horse and developing the experience needed to become a master in the art of breeding.

A healthy foal is valuable in every way, and a healthy mare will be able to give birth to other foals for your farm. The mare's pregnancy has an emotional and economic value. It is therefore essential to be as well prepared for the birth of the foal as possible. Knowing how to behave in order to face the whole process

with serenity and closeness towards the mare and the foal. It is vital we give these animals the right amount of help as without it labour could include unpleasant difficulties.

Challenges

A mare's birth can be unpredictable: it can start suddenly and even present numerous complications. It is precisely these that must be avoided or resolved immediately. Otherwise, they could also make a negative difference to the foal's health.

Foaling can be a difficult process with complications that can, unfortunately, lead either to the death of the new-born horse or



the mare, or to health problems for either or both of them. In order to help the dam in a practical way, the first thing to know for sure is the date on which the baby was conceived. In this way it will be possible to make the right calculation, considering about 340 days of gestation of the animal, and find the period in which the birth of the foal can take place. By doing this, it will be easier to understand which days you will have to follow the mother with more apprehension and ensure your team is on standby and ready to be present and

prepared to help the broodmare give birth as this is the most valuable thing we can do and decreases birth-related complications allowing us to reclaim time and manage problems that can be encountered such as:

- The mare is in the right position for foaling when the water breaks
- a leg that flexes in the birth canal
- an inexperienced mare who fidgets and complicates the foal's exit
- A foal that isn't exiting with the help of its forelegs
- a foal born through a prolonged birth can struggle to attach to the udder.
- the need for the administration of a bottle of colostrum

How foal monitoring technology helps

The equine breeding world has always been concerned with assisting mares at delivery time and has achieved this in a variety of ways, from foal watchers, to CCTV camera systems, to systems that measure perspiration or others that sense when the animal lies down. However, all of these systems have limitations because in addition to still requiring a fair amount of investment, they force the operator to keep a constant watch and also they easily generate false alarms.

With Sisteck's equine birth signalling system you simply have your Vet install a small sensor device to your mares vulva in the last period of pregnancy. This detects the first contractions, which are usually involved in the early stage of parturition, and transmits to the base station a message that triggers the preset alarm notification process which can include the sending of preset text messages and/or prerecorded voice calls to all the right people so they have the opportunity to be present to give assistance during foaling right from the beginning and that their Vet (who, like a midwife, should also be prepared for and



present at the event) can also be there to provide extra security in the event of any problems.

Because the process is 100% automated and highly accurate it also means breeders aren't dealing with the nuisance of false alarms or being forced to spend long sleepless nights waiting up watching the camera feeds for the crucial moment.

The Foaling alarm

The need to be present at the most delicate and valuable moment at the beginning of a new life created the need for Sisteck to research and develop the C6 Evo and C6 Birth Control systems that are the market leading foaling alarm systems now relied upon by more than 700 breeders to remotely monitor mare pregnancies and foaling and help them reduce the numbers of problematic deliveries and efficiently ensure they are there to provide the best care at this wonderful moment.

The analysis of parturition physiology, anatomy and function of the mare's reproductive system was crucial, combined with electronics and hardware capable of being reliable and leak-proof once placed on the animal.

The installed equipment, after having done its job, is uninstalled and, once cleaned, is ready for use again and with new mares.

The equipment can all be simply managed through a smartphone app and the transmitting sensor (made of a plastic material of remarkable chemical and physical strength) has a wide-range radio module inside that is capable of transmitting more than 500 m away, covering an area of 1 km in diameter, and is easy to install by your Vet.

The service works through mobile telecommunication networks but for farms that lack coverage or have poor coverage there's also the ability to connect to the farm's wi-fi network and receive the alarm signal through notifications including a siren wirelessly connected to the receiving base. Power fail safe: the C6 basestation has an autonomous long-life battery which enables it to operate even in the total failure of an electricity supply blackout.

Future

This aspect also opens the door for us to be able to offer other services that can be connected to the same receiver base with different transmitters, such as access control and remote controls in the near future.

By beginning to connect and start automatically collecting data during a pregnancy with a foaling monitor the door is opened for the support of Breeders who wish to utilise a wide range of HorseTech innovations.

At it's most basic these could be the use of the Foaling Monitor base station to connect and control other transmitters and technologies. Nearly every chapter of this report will give you an idea for something that could benefit from connectivity eg. the smoke alarms, horse music system, wearable sensors, stable environment sensors, etc.

Beyond that the system also offers the opportunity to connect the foaling mare to an

Equine Medical Record database which would also open up a market for remote specialist Veterinarian advisors who have data analysis expertise as they could also see the information alongside other medical record information like ultrasound scans, stable-side diagnostic test results, etc.

It's imaginable that a system like this could be developed to produce protocols that could be followed to optimise in realtime the decisions made by breeders. Biofeedback mechanisms alerting them in timely ways to things they could be doing to help their Horses (eg. additional rugging when [AccuWeather.com](https://www.accuweather.com) is predicting bad weather etc) and warning notifications when symptoms of disease or problems are detected that could lead to a poor outcome/death of the Horse and/or it's foal eg.

- Loss of appetite (perhaps captured by a wearable sensor that calculates eating habits by analysing grazing motion data).
- Excessive Sweating (perhaps captured by skin patches containing biosensors)
- Moaning sounds (perhaps captured by processing audio recordings of sounds made by the mare and/or foal and captured by a wearable sensor)
- Data captured from using specific stable side diagnostic tests (eg. Cardiac Rhythm captured by an Alivecor ECG device, an Insulin Test, an Oestrogen test, etc).

The future of human pregnancy and baby care will involve a smartphone connected experience that involves biosensors and diagnostic tech. There are opportunities for us to advance the health and care offered to our horses while pioneering the development of the key technologies in the equine world.



Shawn Wilkie,
CEO, talkatoo.com

NATURAL LANGUAGE INTERFACES

Voice to Text enables you to speak to a computer and have it write your words. The technology is becoming increasingly accurate and easy to use thanks to ever

faster processing power in smartphones, more reliable mobile broadband connectivity & easy to use wireless earphones with inbuilt microphones that are increasingly sophisticated, inexpensive and empowering of natural language controlled interfaces.

It's thought the QWERTY keyboard was designed to avoid mechanical lockup of strikers on mechanical typewriters by ensuring that letters that were commonly used together weren't adjacent to one another. It's completely impractical for the Equestrians needs and anyone who has typed up a long text message on a mobile will also know that smartphone keyboards can also be too finicky to be useful.

Natural Language Interfaces (NLI's) offer completely Handsfree communication and this will provide a greatly superior interface for equestrians by freeing them from the distractions of the need to stare at a screen or type on a device and enable them to dedicate their hands and eyes to their horses.

Many of the most talented and experienced Equestrians aren't able to read and write (often because their equestrian talents were identified so early that they dedicated their formative young lives to be with horses rather than in classrooms) and so by making digital communications as simple as a talking to another person (a natural language interface)

we can help ensure we include their expertise and opinions in our increasingly online world .

Emergency Calls

The most obvious reason for every equestrian to learn how to control their Mobile with their Voice comes in the event of an emergency. The ability to say "Siri call me an ambulance" and then share your GPS location could save your life or better assist you helping someone else. Accelerometers in the latest smartphones can even be set to detect falls and there are incredible apps coming to serve the unique needs of riders from app developers like HorsePal.com

The ability to instruct your smartphone with "Siri call my Vet" could be invaluable for your horse in an emergency as you could use your hands to follow instructions and deliver life saving care to your horse.

Executing your "In event of Fire" plan (see the "Fire Safety" chapter of this report) to the best of your ability can be aided considerably by handsfree calling. Being able to rescue

your horses while coordinating a timely emergency Fire Service response you could avert a complete disaster.

As Horses become increasingly connected (see especially the 'wearables', "Audiology" and 'Foal Monitoring' chapters) Equestrians will increasingly benefit from seamless handsfree communication to organise emergency responses as the alerts can come at anytime and wherever you happen to be. Even it's just to help you keep your hands free to take notes, look up information or to ride



The movie "Her" damaged public perceptions of NLI's by depicting a dystopian future in which a tech geek falls in love with the computer he communicates with via his earpod.

your quad bike across the field this can be very valuable and is worth planning for.

Veterinary Care

Natural Language Interfaces offer the potential to extend high quality Veterinary advice to Equestrians in unimaginable ways across divides including economic, geographic and languages. Imagine being able to give your horses history to a Equine Vet chatbot with just your smartphone? Imagine an app that could understand a Horse owners questions, take from them a comprehensive history (at anytime and in any language) and generate an appropriate response with high quality clinical advice and guidance.

FutureVet/SuperVet

Clients place considerable value on a Veterinarians competency with technology so smart Vets are now keen to modernise their electronic medical record systems with NLI's from companies like Talkatoo.

Talkatoo offers veterinary specific dictation software, eliminating the need to type. The Vets mobile app simply allows them to dictate notes on the go and access them later. Their new product, Verified by Talkatoo, is a full service offering that goes one step further: their team of transcriptionists clean up veterinarians' notes and put them directly into the practice management software.

The new consulting experience is revolutionary as it lets clients see the medical records being created and interrogated with decision



support tools to enable rapid data input, detailed history taking which supports diagnostic tools and validated clinical triage algorithms and remote telemedicine expertise. Experienced Vets are keen to innovate as the opportunities to advance horse welfare and science make it one of the most exciting areas for HorseTech innovation but also telemedicine is radically transforming their careers and will save them wasting years of their lives travelling. .

Vet schools should be prioritising the use of NLI's amongst students and either making their use an entry requirement or something that is taught on the curriculum and used in examinations.

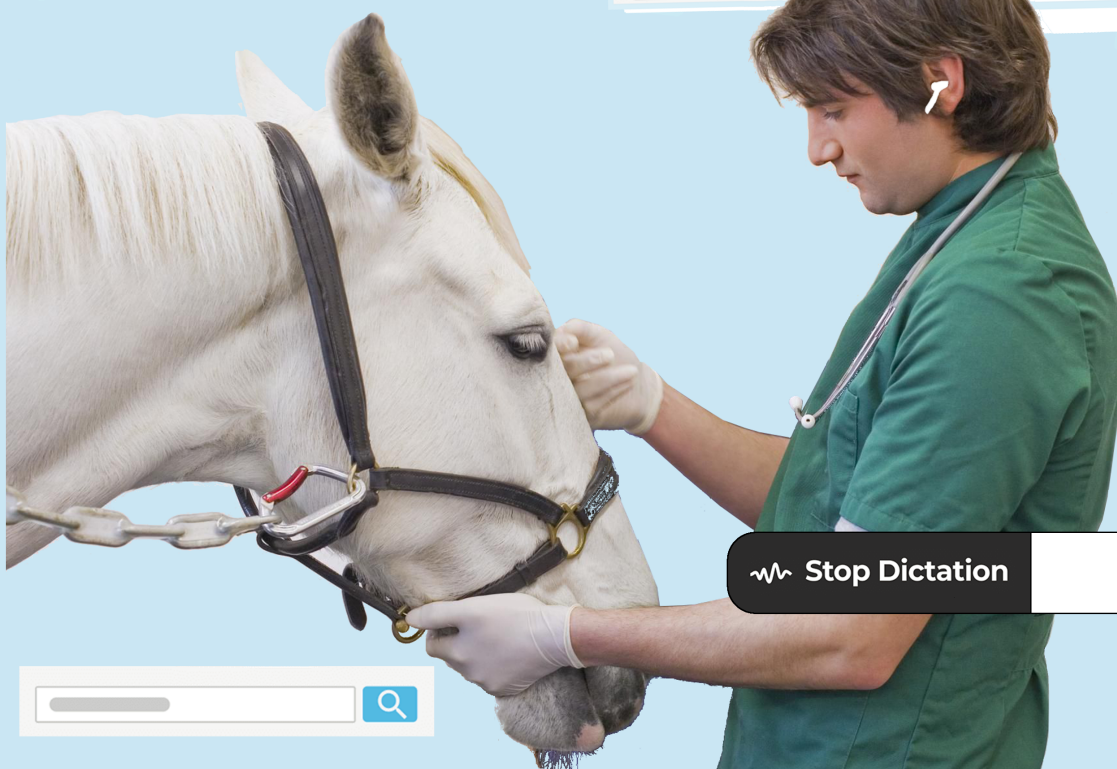
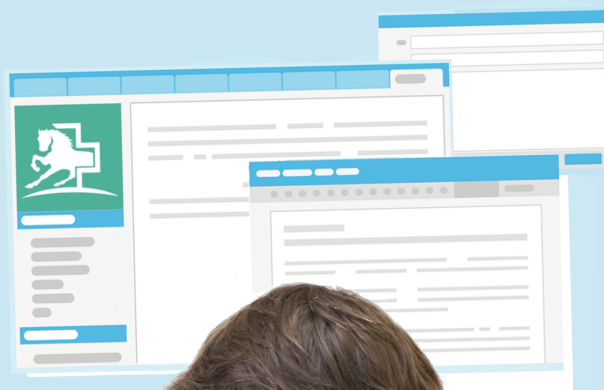
New roles could also emerge eg. Vets who would normally just be doing Vet Checks at sales could easily start working in the sales rings wearing Augmented Reality headsets to connect them with their clients (remote bloodstock agents and syndicates) to do some bidding.



Book a Demo

Fast track to even happier horses|

Talkatoo is the veterinary dictation software you've been missing to reduce the time you spend on documentation.





David Doherty,
Curator, HorseTech
Market Report

Astrology is a practice involving the study of the movements and positions of celestial luminaries and their influence on human affairs and natural phenomena. An ancient set of knowledge and practices that has widely been supplanted by modern sciences, modern horse breeders are one of the few Professionals that still share information on how they use Astrology in their work.

The idea behind using astrology in elite horse breeding is to create the optimal environment for a foal's conception, birth and early life to ensure the best possible traits and characteristics can be passed on and develop.

Astrological data can be used to help identify the most suitable time for breeding. It is believed that certain alignments can greatly influence the development and behavior of the foal. For instance, a foal born under a favorable alignment is said to be more likely to excel as an athlete and be smarter. This is far more observable in the racehorse than human counterparts as the horses are all hyper-elite athletes, are being selectively bred, mature quickly (flat racehorses can be retired by 4 years of age) and the objective is very narrow (eg. to be first to pass the winning post at the Epsom Derby).

Birth charts

Astrology can be used to identify the strengths and weaknesses of a horse based on its birth chart, which can guide breeding decisions. The birth chart is created based on the date, time, and location of the horse's birth, and it can provide insights into the horse's temperament, potential health issues, and performance abilities.

Access to Astrological data

Where punters can gamble on horses it's possible for astrological data to be used to not only validate astrological predictions but also to gain significant financial advantages. Unfortunately a decision made by the International Stud Book Committee (ISBC) in 1976 to make the birth date of all racehorses the 1st January makes this very challenging. The ISBC is a regulatory body that oversees the maintenance of the Thoroughbred Stud Book (used to register and identify



HRH Queen Elizabeth II RIP (the world's most powerful woman) ponders the knowledge shared by Colonel William Hall-Walker (later Lord Wavertree) the Astrological genius that founded the Irish National Stud.

thoroughbred horses for racing and breeding purposes) and made this decision to standardize the birth date to address issues with inaccurate and inconsistent record-keeping.

The Veterinary Science that was used by the ISBC would inspire any critically thinking breeder to immediately hire the services of an astrologist as it argued that Horses mature at different rates depending on when they are born. Standardizing the birth date to January 1st was thought to be a way to level the playing field for all horses and ensure that they were judged on their physical and racing

abilities rather than their age but it's effectively made it more challenging to use astrology to get a competitive advantage unless you have a very long term strategy in developing horses.

While there was some initial resistance to the change, the standardization has been widely accepted and has become the norm for registering thoroughbred racehorses. The major sales companies further incentivise the production of horses that are born early in the year with sale dates and innovative rebate opportunities like Auction Sales Stakes races that are only open to graduates of sales.

Today, the birth date of a thoroughbred racehorse is recorded as January 1st, regardless of the actual date of birth and the industry should urgently make changes as it's really not technically excusable now that we have Equine Medical Records and every breeder has a smartphone that could be used to capture & upload an image that would create a time/date/location stamped birth certificate. It's also not good for animal welfare (horses wouldn't naturally foal in January) or staffing (spreading out workload for breeders would mean less demand on limited resources and more births could be attended by Veterinarians etc).

The Next Eclipse

Astrologists have a very different understanding of an eclipse than modern day scientists but thankfully horse breeders that are disagreeable geniuses that are remunerated well in the hyper elite racehorse industry because if you are doing something wrong and you breed and train the world's best racehorses you're doing it right.

David Doherty (author of this chapter and curator of this report) is seeking to help breed another Eclipse and would invite your interest



NASA shared this total solar eclipse path for 8 April 2024 (starting on Mexico's Pacific Coast at 11:07am PDT and exiting Continental North America at 5:16pm NDT).

in the project. The next opportunity is Monday April 8 2024 so please get in touch if you'd like advice for any breeding on dates around the start of May 2023.

Conclusion

The ultra competitive environment in which elite racehorse breeders have to operate incentivises them to question every detail and innovate to produce brilliant genetically superior, intelligent, healthy and athletic animals.

Because there is a very low barrier to entry (you could've bought Hewick - the Irish Horse that won the 2022 American Grand National - for just €800) and the world's most powerful and affluent families want to own the best horses anyone who can get a track record proving their competence with insights from a discipline like Astrology that can reliably help predict the potential in a horse will be very well supported and remunerated regardless of their background or the general public acceptability of their theories and ideas. Sound and vibrational healing is a holistic approach to well-being utilising the powers of sound and vibrations to promote physical, mental, and emotional healing.

Sound & Vibrational Healing

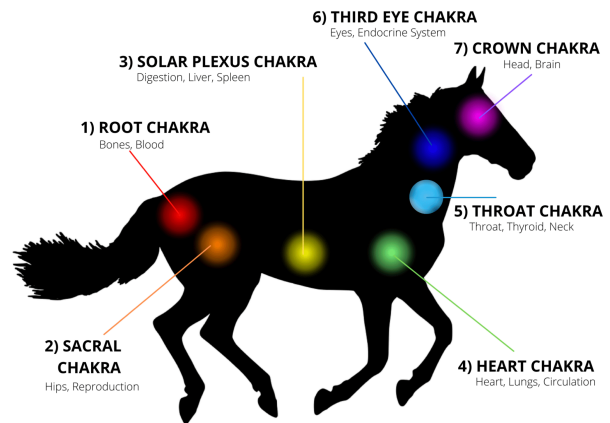


Sharon Quigley,
Founder,
Pythagoras Institute of
Vibrational Healing

Everything exists in a state of vibration, including our bodies and the energy systems within our cells, and applying our knowledge of this makes it possible for us to create specific sounds and frequencies to bring balance and harmony to the body, mind, and spirit.

Sound Therapy

Sound therapy involves the intentional use of various sounds, such as vocal toning, singing bowls, tuning forks, drums, gongs, and other instruments, to create healing vibrations. These sounds can be produced and directed by a trained practitioner or experienced through recorded music specifically designed for therapeutic purposes. In the Ancient World these therapies were mainstream and it's fascinating that the stables used by elite racehorse breeders provide us with an unrivalled opportunity to rediscover the technologies and understandings that were known and used extensively in the ancient world eg. the Wanamaker "Organ" weighing 287 Tonnes remains the world's biggest instrument (it is now located in a department store in Philadelphia after being retrieved from the Festival Hall that was



demolished after being the centre piece of the 1904 St. Louis World's Fair).

Frequency and Resonance

By subjecting the body to certain frequencies it's possible to bring it into a state of resonance



that can restore balance. The music industry clearly understands how to heighten the emotions in humans and horses greatly enjoy

The world's biggest musical instrument (renamed the "Wanamaker Organ") was removed from the Festival Hall in St Louis after the 1904 World's Fair.

THE IRISH TIMES

Thoroughbred horse bodies warn wind turbines could affect investment

Submission calls for devices to be kept a safe distance from stables and training yards



A wind turbine stands beside pylons in a field near Sehnde-Muellingen in the region of Hanover, Germany. Photograph: Julian Stratenschulte/EPA

Alison Healy

Mon Feb 24 2014 - 16:52

Four thoroughbred horse bodies have warned that investments in the bloodstock industry could be lost if wind turbines are not kept a safe distance from stud farms and training yards.

Joe Osborne, managing director of Kildangan Stud, said investments in the industry could not be taken for granted and wind turbines must be placed at a suitable and appropriate distance from stud farms, stables and training yards. He said thoroughbred horses were particularly sensitive to noise and visual cues, unlike other farm animals.

music and can have very specific individual tastes.

The potential for biofeedback mechanisms to be used with super smart horses to expand on this is exciting as they can help us rediscover and validate the processes by which certain frequencies can stimulate relaxation, reduce stress and promote cellular healing in the body.

Equine sensitivity to Sound &Vibration

It's challenging to prove the negative/toxic impact of electromagnetism, environmental sounds & vibrations on humans. Because Racehorses are very sensitive and can only reach their owners ambitions if their

environment is optimal they are critically sensitive to harmful frequencies/energies that humans aren't even be able to sense eg. the Thoroughbred breeders in Ireland ('Land of the Horse' & 'Home of the Thoroughbred') are so advanced in their understanding of the threats that they campaigned successfully prevent the installation of wind turbines that were being used to industrialise the countryside.

Chakras and Energy Centers

Sound and vibrational healing often involve working with the body's energy centers, such as the chakras. Chakras are believed to be spinning wheels or vortexes of energy located along the body's midline. Each chakra is associated with specific qualities and emotions. Sound therapy can be used to balance and align the chakras, promoting overall well-being.

Brainwave Entrainment

Sound and vibrational healing techniques can also involve the use of binaural beats or isochronic tones. These are specific sound frequencies played in each ear, which can help to synchronize brainwave patterns. By entraining the brain to specific frequencies, it is believed that states of deep relaxation, meditation, or even heightened focus and creativity can be achieved. Imagine you could use this knowledge to communicate with and ensure your horses understood what's going on and your plans for them?

Emotional Release and Stress Reduction

Sound and vibrations have the potential to facilitate emotional release and reduce stress levels. The soothing and calming nature of certain sounds can help relax the body, quieten the mind, and release tensions and

emotional blockages delivering a sense of peace, clarity and improving overall well-being.

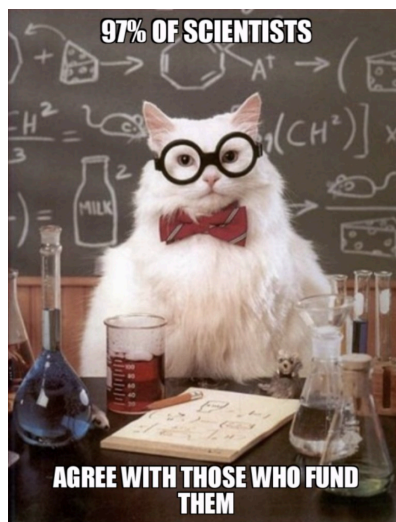
Validating Energy Medicine

Every culture has a name for life force complete with a philosophy to understand it and a method for utilizing it and the use of sound & vibration as a healing practice has been an obsession within different cultures throughout history. Techniques include sound and color therapy, magnet therapy, laser therapy, homeopathy and even acupuncture and they're all based on the belief in an underlying life force energy.

Sadly much of the history is forgotten, hidden or discredited but the opportunities for reinvention and reintroduction of these with the help of the Horse and Equestrian are super interesting.

Even though every Doctor appreciates the value of radiologists (who use radiowaves to present diagnostic opinions) and prides themselves on their abilities to perform percussion on Patients to accurately diagnose illness from the 'tones' elicited by their finger taps the idea of working on a life force has not been accepted in the current organic model of medicine and there have been significant efforts to ridicule, suppress and defame the pioneers using it as the basis of a therapeutic model.

The racehorse industry is a life line to therapeutic innovations looking to distance themselves from claims of medical 'quackery' because of it's focus on optimisation of health and the prevention of disease in selectively bred hyper elite athletes that are subject to the world's most advanced anti-doping technologies.



Horse First innovation

Breeders and trainers of elite racehorses are perfectly placed to validate Sound and Vibrational Healing technologies. By better detecting disease and optimising their horses environment and health they can thrive in this ultra

competitive winner takes all industry and this provides enviable opportunities to develop the ultimate future preventative/protective environments for mankind.

There are also countless opportunities that emerge for the bloodstock/gambling sides of the industry. Methods that can calculate the relationship between the electromagnetic fields produced by horses and their future potential/preparedness could give significant competitive advantage to those seeking to determine the future potential of an unraced horse or determine from their appearance in a parade ring their odds of winning a race.

The world's first Horse Music system

A system validated with the help of racehorses would be very popular amongst architects seeking to design and build home, workplace, hospital and transportation environments.

We currently have a basic system being trialled that is coordinated with the Equilux Performance Lighting System (see the Chapter on Stable Environment by inventor Sam Murphy) and we welcome your participation in the extensive research project behind it. One of the most productive areas is in finding healthy resonances and directly delivering them in a way that will pair them with certain behaviours and activities.

HorseTech Spin offs

The promotion of healing electromagnetic and radio frequencies to consumers would be a marketing dream because the public is already concerned about the potential harms of mobile, radio and EM radiation being emitted from electrical supply networks, appliances, automobiles etc. Imagine people wanting to live next door to a Mobile Phone Mast or growing plants in their autonomous electric vehicles because the cabins offered such health optimised environments (see the Transportation chapter in this report).

Future

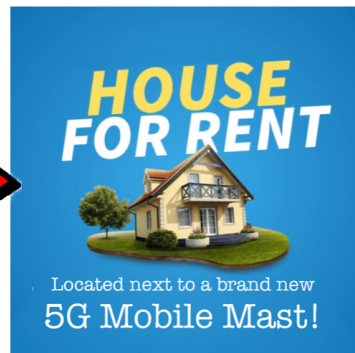
An accurately controlled Horse Music system also enables other innovations to be developed:

- * Environmental control mechanisms controlled by sensory bio monitoring wearables that utilise powerful machine learning technologies.
- * Supporting stable staff to have their horses leave the disruptive Gregorian calendar and to start coordinating their activities and sleep to synch with the powerful lunar cycles, natural breeding cycles, etc.
- * Scientists are increasingly capable of identifying signature frequencies of various viruses, bacteria, and diseases along with the signature frequency of healthy organs, tissue and emotions. This offers the opportunity to restore bodies by imprinting their bodies with the desired frequencies via sound/vibrational energy.

Mobile Phone Masts Today....



In a Healthy Future?



EMF Concerns with Electric Cars....



Healing EMF cars of the future?



Secure Messaging



Laszlo Borbiri,
Software Engineer &
Support Specialist
LaneTelecom.com

The equine industry is a complex, highly regulated, and multi-faceted sector consisting of numerous stakeholders with varying roles and responsibilities. As a result, communication has become a significant challenge for individuals and organizations. Inadequate communication and coordination between trainers, vets and owners can result in severe consequences to the horse including health problems, impaired performance and significant financial liabilities.

The Equine industry is also highly sensitive to confidentiality and privacy concerns. Confidential documents like non-disclosure agreements (NDAs) are used to protect sensitive information such as trade secrets, business processes, and personal details of individuals in a company. Trade secrets that relate to professional contacts, horse sources, and training methods must be kept secure and confidential in the equine industry.

With a diverse and dynamic workforce coming from a wide variety of backgrounds there will always be challenges but these are often compounded because to have developed the innate horsemanship needed to be successful employees will often have spent extensive periods of time out with horses and so they're often the members of our modern society that are most lacking in IT technical skills and experience which can make it challenging to introduce new communication platforms in addition to their role.

Data breaches are another massive challenge in the Equine industry and most equine organisations have pressing privacy issues and a need to introduce secure communication processes. Poor communication and

compliance on behalf of horse vets and owners can result in consequences that include health and performance issues and a data breach can be career ending for teams eg. from the loss of the client base, reputation damage and legal action which is becoming increasingly common in the age of data breaches.

With the evolution of technology and digitalization, secure communication is slowly finding its place in the equine industry. Most important communications occur between owners, bloodstock buyers, breeders, trainers, veterinarians, and they all have the need for integrated messaging solutions that streamline communication while remaining reliable and secure.

The increasing amounts of data being collected and processed mean there are new challenges to making decisions and the ability to have multiple decision makers informed and giving their consent quickly can increase the competitiveness of a team significantly.

Opportunities

Secure communication is a vital aspect of the success in the equine industry. Equine organisations need to recognise the challenges and incorporate technology solutions that prioritize secure communication and data privacy. By making communication secure, equine industry professionals can ensure the horses welfare, maintain confidentiality, and establish a reputation for safety, reliability, and trust with clients and stakeholders.

The adoption of new communication technologies has opened up endless opportunities for improving the way clients and vets interact, leading to better health and performance outcomes for horses. With regards to secure messaging, a more organised and efficient system of

communication can be established while ensuring the protection of confidential documentation.

Secure messaging allows for efficient, real-time communication, regardless of location. This is particularly relevant in the equine world, as horses aren't just the most transported animals but they also must travel at short notice based on complex strategic reasons, with accurate and up to date passport and vaccination documentation as they move between stables, training centres, racecourses, studs, Vet Hospitals, etc.

In addition to protecting trade secrets and proprietary information the timely exchange of information can empower more confident and informed sharing and acting upon of information. As data scientists become increasingly relied upon we'll see this data additionally being used to modify training strategies, feeding regimes and therapeutic and medical interventions.

Solutions

Undoubtedly, the equine market is a highly regulated sector, thus requiring reliable and secure communication solutions. Governed by various stakeholders and regulatory agencies, the industry has evolved over time and demands more stringent privacy measures for the exchange of sensitive information, including contracts, liability, horse lease and sale agreements, breeding, boarding, etc.

As a solution to these increasingly complex security needs, integrated secure fax messaging systems are well positioned to become a part of industry protocol ensuring horse welfare and success. One such solution is Lane, an integrated messaging platform designed to allow for secure, trackable, and centralised communication that promotes accountability and improved visibility.

Lane's secure messaging solution integrates seamlessly with existing systems, while providing a centralised location where parties can securely exchange information and engage with collaborative documentation. It also provides comprehensive tracking features, allowing users to verify and document each step of the communication process. This tracking can be particularly helpful in addressing liability concerns.

Lane also boasts a superior support team, ensuring that each user can maximise our integrated messaging platform's capabilities. This is especially useful for workers who need help with navigating new platforms. In turn, this leads to improved user experience and efficiency.

The Equine Industry is a uniquely diverse and highly complex market with numerous stakeholders regulated by various agencies. For this reason, secure communication remains a critical issue in optimising horse welfare and success. With advanced technology solutions such as Lane's integrated messaging platform, those working within the equine industry have an effective way to achieve flexible communication while meeting stringent security and compliance requirements.

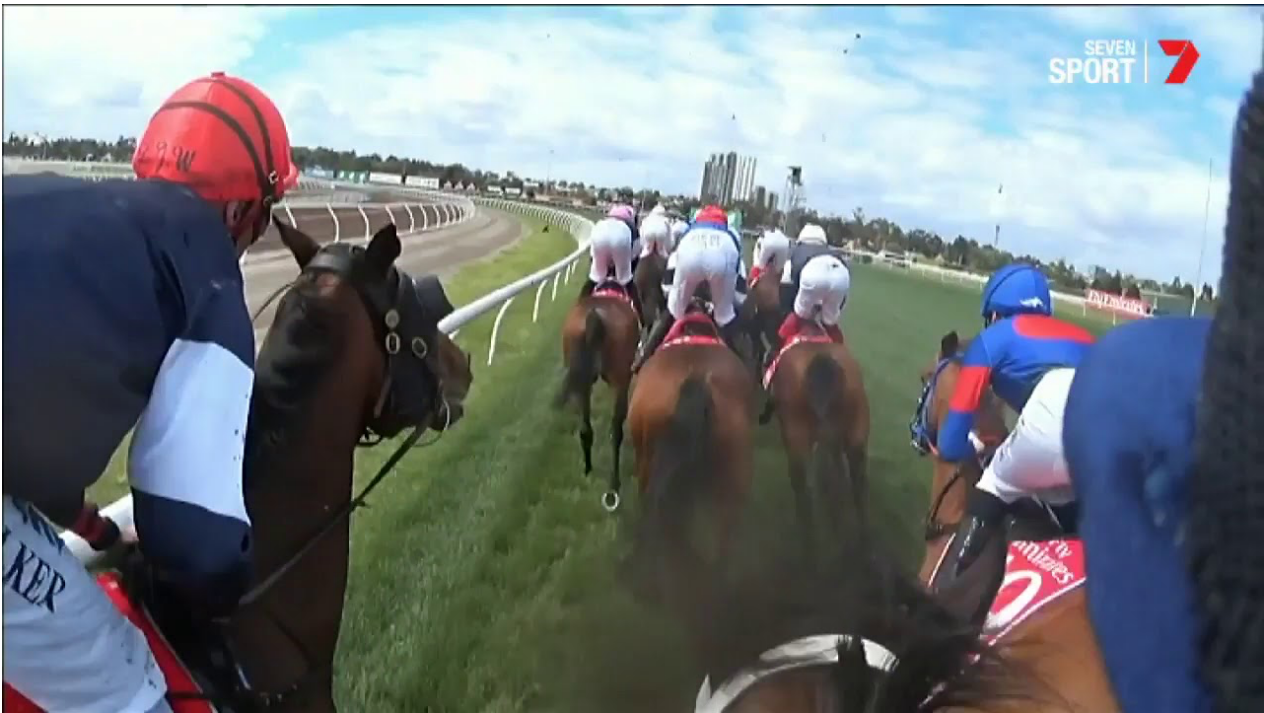


<https://www.lanetelecom.com>



David Doherty,
Curator, HorseTech
Market Report

AWAITING TEXT



CONTRIBUTOR BIOS/CONTACTS

The HorseTech Market Report was made possible by the support of the world's most talented innovators. Please share their work with your colleagues and feel encouraged to work with them to improve the health, welfare and performances of your horses.



David Doherty, Curator, HorseTech Market Report

David studied Medicine in London while living above a Veterinary Clinic and it gave him great insights into the opportunities that emerge when we take a One Health approach to developing prevention focused medicine. In 2017 he launched the HorseTech Conference at the Royal Veterinary College London. The event sold out and attracted a livestream audience from around the world and feedback indicated that the industry needed a Market Report that David has curated here with the help of the most pre- eminent experts. David is particularly interested in advancing our understandings of the unique neurological adaptations of the equestrian and thinks the HorseTech Conference will be successful when the popular "we put a man on the moon" colloquialism is substituted by mankind's most important achievement: "we learnt how to perfect the breeding and optimise & greatly extend the health span of the horse".

<https://HorseTechConference.com> https://twitter.com/Horse_Techie



Prof Emmeline Hill, Equine Geneticist & CSO, Plusvital

Professor Emmeline Hill was a co-founder of Equinome Ltd. and leads the Plusvital R&D team. In 2004 she was awarded a President of Ireland Young Researcher Award to establish the world's first academic research programme dedicated to understanding performance traits in the Thoroughbred. She has been at the forefront of Thoroughbred performance

genomics during the last decade and has published more scientific papers on equine exercise genomics than any other researcher worldwide. She is an Associate Professor of Equine Science at University College Dublin and leads the Equine Exercise Genomics research group at UCD funded by Science Foundation Ireland. She has retrained a former steeplechaser to be her weekend hack and she rides regularly with her two children.

<https://www.plusvital.com>
<https://twitter.com/emmelinehill>

Sam Murphy, Founder, Equilux Lighting

Sam is the Inventor and developer of the Equilux performance system which is a performance lighting system used by many of the worlds top trainers, studs and sale consignors (93 G1wins in 7 countries and counting).

<http://www.equilux.ie>
<https://twitter.com/equiluxlighting>



Louisa Williams, Horseware Ireland

Lousie started in Coolmore Stud in Co Kildare before horses in the US, France and mostly Ireland, where she has worked with trainers Charlie Swan and Aiden O'Brien.

<http://horseware.com> <https://twitter.com/chilkoracing>





Jeffrey R. Schab, Founder & CEO, Protequus

Jeffrey founded Protequus in 2013 after the sudden loss of one of his horses from colic and is devoted to optimizing health-related outcomes and enhancing the well-being of horses. He is an accomplished equestrian and biomedical engineer who has a passion for horses and eye on innovation. Having spent more than 15 years in the pharmaceutical industry and founding/operating one of the largest medical marketing firms in the United States, Jeffrey intimately understands the critical success factors to bring value-add solutions to market.

Jeffrey holds a dual degree from Tufts University, and his peers call him a visionary who looks at what can be versus what is not. His relentless commitment to excellence and compassion for animals has put Protequus® on the fast-track for success. Unrelenting optimist dedicated to transforming the \$75B+ animal health market through data science and predictive analytics.<http://SmartHalter.com>



John Ormonde, Founder, John Ormonde Wexford Sand Ltd

John Ormonde Wexford Sand has been in the specialty sand business for over twenty years. Through collaboration trainers and competitors on a local and national level; John Ormonde Wexford Sand have gradually cultivated this experience to become innovators in developing the finest synthetic mixed surfaces for equestrian use.

John Ormonde Wexford Sand only use specialty clean sub angular Wexford Sand and post industrial fibres that are fully traceable. Free from dust and chemicals. Good for you, your horse and the environment! We are CIF,

CIRI and the Department of Agriculture approved.

<http://WexfordSand.ie>

<https://twitter.com/JohnOrmond>

JohnOrmond

**Prof Sam Lingam MD (Hons)
FRCPCH (Glas) FRCP DCH
DRCOG, Consultant
Paediatrician**



Professor Lingam is a Russian graduate and obtained his MD with honours in 1970. He came to the UK as a refugee and worked in the NHS for over 30 years until he retired at age 60 in 2004. He has been a Consultant Paediatrician in Community Child Health in the NHS since 1989 in Redbridge, Harlow, Haringey and Great Ormond Street Hospital. He was trained in paediatric neurology and child development at Great Ormond Street Hospital.

Professor Lingam is on the Specialist Register of the General Medical Council and is a Fellow of the Royal College of Paediatrics and Child Health and he has been an Examiner of the College for 15 years. He is also a medical assessor at the Appeal Service of the Judiciary. He was appointed as a Regional Medical Appraiser by the Ministry of Judiciary and holds a District Judge status. He has been sworn. He is an expert witness specialising in developmental paediatrics - in particular, cerebral palsy, downs syndrome, ADHD, autism and foetal alcohol/anticonvulsant syndrome. His special interest is paediatric epilepsy, immunisation issues and tuberculosis.

Professor Lingam was Professor of Medical Education for St. Eustatius University Medical School and Dean for Europe. He is passionate about medical education - both undergraduate and postgraduate. He was on the Board of Science and also the Board of Medical Education of the British Medical

Association for many years. Professor Lingam has widely published and has authored several books. He has set up the Specialist Express Clinic and the Paediatric Chambers to provide the highest standard of expert consultant opinion in Harley Street.

In 2009 Professor Lingam was elected as the Honorary secretary of the Indian Medical Association and he is the Treasurer of the London Regional Council of the British Medical Association. He is the President of the International College of Pediatrics.

<http://medicalexpressclinic.co.uk>
<https://twitter.com/ProfLingam>



J Mark Strong, Director, Multi Radiance Medical

Multi Radiance Medical develops and manufactures FDA-cleared therapeutic super pulsed laser devices, which are used throughout the world to treat acute/chronic pain, bursitis, back pain, carpal tunnel, arthritis pain, tennis elbow, muscle strain, tendonitis, and other conditions. The company has been the technology leader in laser therapy for 24 years and now offers sales and support and regulatory approval in over 30 countries.

Multi Radiance Medical develops and produces the industry's most advanced medical therapeutic devices (eg. LaserStim™ is the first FDA cleared device that combines laser-light and electrical stimulation in one probe) which use low dosage electro-magnetic radiation, integrating pulsed laser, visible red and infrared lights and magnetic field.

Our devices are engineered by the world's top space scientists and radio engineers thanks to a partnership with a spin-off from the Russian space program (MILTA) and the company supports elite professional sports teams worldwide

The Veterinary division's PRO System, ACTIVet and MyPetLasers are not only the best cordless, safest and the easiest to use, they are ONLY therapeutic Lasers backed by the real deal peer-reviewed controlled studies showing efficacy, significantly better depth of penetration, long lasting effects and proof of accuracy in dosimetry. Hundreds of great case studies and happy user stories, but peer-reviewed? That's the gold standard. Call us before you spend your hard-earned money. Next to our outcomes the unlimited tech support will be what you love most.

<http://MultiRadiance.com>
<https://twitter.com/jmarkstrong>

Sandra Murphy, Founder, Equidiet



Sandra Murphy graduated from University of Lincoln with a 2:1 BSc (Hons) Equine Sports Science Degree and is currently the Senior Nutritionist at Equidiet (UK) Ltd. She started riding at 7 years old and has owned, trained and bred horses for 40 years. Sandra represented the Royal Air Force in Showjumping, Dressage and Eventing and was one of the founder members of the Joint Services Equitation Centre in Middlesex. She vowed she would find a solution to a situation she found herself in 27 years ago, when her horse suffered severe dehydration after a day hunting.

Sandra said there was nothing around at the time that I could give him, apart from a bran mash, however it was difficult to administer as he would not drink or eat anything, so the vet had to nasogastric tube him and put him on a drip, which was very distressing for the horse and for me.

After years of trials she finally found the answer. In 2014, Sandra found a natural way to encourage voluntary uptake of fluid to increase the hydration in the hindgut, therefore

it is possible to: "Lead a horse to water and you CAN make it drink"

<http://equidiet.org.uk/> @equidGel



Craig Robertson, Founder, Epipole

Craig develops intellectual property in the domain of image, data and signal processing. We are currently working in the space of medical imaging devices particularly tuned to the detection of retinal pathologies. Retinal imaging is an area where disruption has been due for 50 years at least, an area where overly complex instrumentation at exorbitant prices has generally been the rule. Using high technology and precise, extreme manufacturing techniques we are slowly bringing about the revolution that is required.

Our company relies heavily on hugely qualified engineers of course but my own background is in invention, mathematical problem solving and algorithm development. I have technical skills in 2D and 3D imaging, automated medical image analysis and processing, machine vision, 3D reverse engineering, optimization, evolutionary and genetic algorithms, haptics, visualization + high-end graphics, high performance parallel processing and high-throughput computing.

I've invented 3D data acquisition systems, patented several inventions and programmed in C (and many other languages) for over 30 years. I'm currently spending a lot of spare time in electronic prototyping fused with Android development.

When I was an academic, I produced thirty-odd peer-reviewed research papers, co-authored three books and produced many technical reports on subjects ranging from automated diagnosis to evolutionary optimization and Open Source business

integration. I was working on what is now called Deep Learning back in 1992, few things in mathematics are new, they just get new names. <https://www.epipole.com> https://twitter.com/epipole_ltd

Gavin Mitchell, Managing Director, IMV Imaging

Gavin leads a team to provide the best products and services to veterinary practices. Ultimately the buck stops here, but I get great satisfaction developing a brilliant team of dedicated staff who want to deliver the best customer service.



My previous roles in IMV imaging have included developing our distributors throughout the world. I spend the vast majority of my time today working on the strategic development of our business and maintaining relationships with our key suppliers.

My spare time is busy, enjoying cycling, kayaking, sailing, hill walking and a wee bit of running. I frequently have a camera in my hand and have a weak spot for cars.

Please feel free to contact me. I would be happy to help. <http://imv-imaging.com/> <https://twitter.com/gavinbcf>

Fran Jurga, Editor, HoofCare Publishing

Hoofcare Publishing chronicles progress in the art and science of preventing, recognizing and treating lameness problems in horses. Methods covered range from barefoot trimming to hoof boots, horseshoeing, equine podiatry and veterinary medical and surgical treatment. The history and culture of the professions are also a feature. The Hoof Blog is written for and by the dedicated professionals from all fields who are



at work in the rewarding pursuit of optimizing performance or facilitating rehabilitation.

Hoofcare Publishing supports and champions a diverse worldwide community of professionals via a portfolio of educational and media projects and publications.

<http://HoofBlog.com>

<https://twitter.com/franjurga>



Kerry M Thomas, Founder, THT Bloodstock

Kerry is a pioneer of equine athletic psychological research and Herd Dynamics. He created emotional conformation profiling, which measure's the mental and emotional capacities of the equine.

Emotional Conformation Profiling is the study of Emotional Intelligence & Ability in three key areas; Trainability, Behavioral Genetic Traits, Aptitude, with Communication being the primer. Thomas' theories on herd dynamics and equine communication have applications on all equine disciplines, in addition to human team communication and performance. His first book Horse Profiling: The Secret to Motivating Equine Athletes was released on the international market on April 25th, 2012 and continues to grow in international favor and popularity. Thomas made the breakthrough discovery that it was mental/emotional conformation of the horse, and not the physical body, that governed the dynamics of the herds. With an understanding that this was the foundation of the equine world, no matter the breed of horse or career choices we as people make for them, an entire new world became visible. Focusing on this research, Thomas began to identify ways in which horses could be mentally conditioned toward a given goal. He spent 10 years streamlining his unique system of Emotional Conformation Profiling of equine athletes. In 2008 he officially created his company The Thomas

Herding Technique (THT). Kerry's study of Patterns-Of-Motion have reached an international audience in the last several years because of THT's work in profiling the Kentucky Derby fields.

Teaming up with now THT Director of Equine Services, Pete Denk, Kerry's work has gravitated to international Bloodstock where profiling "who the horse is" and how well balanced their sensory system is, is helping THT clients hone on suitable athletes.

Thomas' work in the field of equine behavioral genetics has pioneering applications in all the sport horse industries, but Thoroughbred Racing embraces the most of his efforts owing to his intensive study of Herd Dynamics & Behavioral Genetic Sequencing. Exciting new efforts are currently being made into the study of how emotional stress affects physical performance.

Considered by many the "Money Ball" approach for horse racing, Kerry moves forward with the belief that "the economics of behavior, simply makes sense."

<http://www.thtbloodstock.com>

<https://twitter.com/thomasherding>

Tim Watson BVM&S PhD MRCVS, Lipogems Equine

Dr Tim Watson, Director and partner at Waterlane Vets in Gloucestershire which is an ambulatory equine practice covering Glos and N. Wilts, dealing with all types of horses and ponies. Special interest in lameness, back problems and poor performance. Director International Affairs at British Equestrian Federation, Chairman, International Committee for British Show Jumping



[@lipogemsequine](http://lipogemsequine.com)



**Hemant Patel FRPharmS,
Dip Pharmacol, M.I.Mg,
Pharmacist**

Hemant is secretary at North East London Local Pharmaceutical Committee. Four-time former president of the RPSGB, Hemant understands community pharmacy. He specifically possesses a deep understanding of pharmacy practice, education, regulation and politics and has led innovative projects in medicines management, public health and retailing. He also served as chairman of NPA, vice-chairman of PSNC and a consultant to a number of pharmaceutical companies. UK Delegation member, Pharmaceutical Group of the European Union, Europharm Forum, UK Delegation member, Representative, Community Pharmacy Section, FIP, Vice-President, Commonwealth Pharmaceutical Association, Director of Havering Healthwatch.

@Hemant1Patel



**Richard Butterworth, Equine
Salt Therapy**

As avid racing enthusiasts, Richard's ancestors gave him his first introduction to horses. Their enthusiasm was very obviously passed down to Richard, because it developed into a strong passion for animal welfare and a 12 year career in agriculture.

Richard's love of horses found him contemplating a natural, non invasive way to treat horses for ailments such as skin sensitivities and respiratory issues. A light bulb moment occurred after holding discussions with veterinary experts and leading trainers. They had talked about combining holistic and scientific approaches to treating equine athletes, which seemed like a romantic notion when working in such a tough, performance based industry. Today Richard dedicates his

passion, devotion to animal welfare, skills and knowledge of horses, and the racing industry. Richard envisaged going out to the country race clubs to trial his new concept but the next thing he knew he was in Australia's leading stable treating million dollar racehorses.

<http://equinesalttherapy.com>
https://twitter.com/equine_salt

**Shayne Heffernan, Economist &
Funds Manager, HEFFX**

Shayne Heffernan oversees the management of funds for institutions and high net worth individuals. Shayne Heffernan holds a Ph.D. in Economics.

<http://shayneheffernan.com>
<https://twitter.com/ShayneHeffernan>



**Philip Carberry,
Business Development,
MustangChain.io**

As a member of the Carberry equestrian family dynasty, Philip (the son of Tommy Carberry) is a world renowned top jockey who turned professional in 1998 and rode for the best part of 20 years, before retiring in 2017. He has rode over 300 winners including many of the world's most prestigious races including the Irish Grand National, the English Champion Hurdle and the Grand Steeple- Chase de Paris.

After his jockey career Philip turned to the training of horses together with his wife Louisa. Together they founded Carberry Racing and are training horses at their state of the art centre in the west of France.

At Mustang Chain Philip provides invaluable knowledge, experience, and guidance while representing the MustangChain Foundation, using these skills to drive global



transformation within the equine industry. Philip will be actively committing a large portion of his time into onboarding and signing clients to use the MustangChain platform. He has already provided opportunities and invaluable insight into making MustangChain a globally recognized solution.

<http://MustangChain.io>
<https://twitter.com/paccarbo>



Dr James Gibbons, Head of Microbiology, Irish Equine Centre

<http://irishequinecentre.ie>

<https://twitter.com/irelandequine>



Dr Barbara Blasko, coFounder, ElectronicVet

Board-certified Emergency Medicine physician with over 20 years of clinical experience. Biomedical Informatics degree from Oregon Health Sciences.

Developer and physician champion for Health Connect, EMR of Kaiser Permanente. Over 5 years both practicing human Telehealth, as well as consulting. Avid Equestrian of 30 years.

<http://electronicvet.com>

<https://facebook.com/electronicvet>

Shelly Townsend, CEO/ Founder/Inventor, Equine Eco Green



Shelly is a lifelong equestrian and farm owner who has a passion for environmental responsibility and sensible solutions. Born and raised in Delaware I grew up around our family farming, poultry and sawmill businesses. Equine Eco Green provides a sound, sensible solution that enables our community to be responsible, good stewards of the environment. Let us lead by example and do our part to ensure our environment is safe for those succeeding us.

<https://www.equineecogreenus.com>

Brad Wilson, coFounder & Technical Lead, Equiprotect



After many years as an operational fire fighter and animal rescue specialist our technical lead Brad decided it was time to do something about rural fire safety and crime. Having attended many incidents which could have been prevented Brad took up the initiative of looking at ways to better protect the rural community, from the first steps it became apparent that it was not just fire safety that was an issue, rural crime, health and safety and awareness all had a huge part to play. From those early days EquiProtect has developed into a one stop site where all these matters can be addressed simply and efficiently, offering easy to follow assessment systems we are able to offer our clients the best solutions for their setting.

[@equiprotect](https://equiprotect.co.uk)



**Amanda MacDonald, Founder,
FullGallop Communications**

Full Gallop Communications delivers dynamic branding, marketing strategy and digital marketing consulting. Full Gallop helps clients push through boundaries by creating and implementing marketing strategies that work as hard as you do to gain visibility, brand trust and business growth by using both traditional and digital tactics.

Featured past and present clients include: HealthLynk Coaching (Ohio), Riders for Well Being (Ohio), Genesee Valley Equine Clinic (New York), Horse Sport Destinations (Canada), Pfera (Canada), Barnlog (Virginia), Biscuit Leather Company (Alabama), Equinutrix Nutrition (Virginia), Horse Guard (Washington), Hoof MD (Ohio), Kids Thrive 585 (New York), AccuCoat, inc (New York), Sydor Optics (New York), Wasatch Photonics (Utah), CMM Optic (Michigan).

With over 17 years of corporate B2B and B2C experience, Amanda brings her passion for marketing and equestrian sport together to bring out the best in every business. Follow her popular marketing blog at FullGallopComm.com for actionable marketing advice.

<https://fullgallopcomm.com>
<https://twitter.com/fullgallopcom>



**Ashley Neely, Bluegrass Horse
Feeds**

TO BE COMPLETED

bluegrasshorsefeed.com
[@BluegrassFeeds](https://twitter.com/BluegrassFeeds)



Michael Brady, Trade Agent

TO BE COMPLETED

<https://www.linkedin.com/in/michael-brady-8aaa8522/>

Aidan Connolly, President & CEO, Cainthus



Aidan is an unusual leader. With 30 years of experience in the agribusiness sector, his role has changed so often that his experience covers the full range of executive and managerial challenges. He has direct experience of greenfield start-ups, high growth environments, turnaround issues, challenging economic environments, in a wide range of political and economic systems. Aidan's leadership experience ranging from strategy to operations to production, as well as developing sales programs and cohesive teams that deliver strong results. Having worked in over 100 countries, lived in six of them and speaking five languages, Aidan is well placed to understand the complexities of virtually any environment. He has worked in political associations, with state and national governments in the US, China, Europe and Brazil, and international organizations such as the European Union and the United Nations.

Aidan has appeared as a commentator on radio and television, often being cited for his knowledge of innovation in agribusiness and the animal feed industry. He holds positions as adjunct professor of marketing at the Smurfit School of Business, University College Dublin, the China Agricultural University in Beijing, and North Carolina State University in the USA. He has published over 30 academic articles and is a regular contributor to social media, where he

is particularly active on LinkedIn and Twitter.
<http://cainthus.com> <https://twitter.com/AJConnolly1>



**Laurent Pupunat PhD,
Waterdiam**

Based in Switzerland, Laurent started working on water pollution for the pharmaceutical and chemical industries and has a PhD in membrane filtration and electrophoresis. He started work on diamond electrolysis twenty years ago at the beginning trying to understand diamond electrodes as a material and its applications. The first application was producing a coating for silicon

components to protect against corrosion and through that work it was revealed that these electrodes could be used as a water treatment. Thanks to extensive research and redevelopment it has been possible to understand how to apply this technology in wellness applications and new kinds of medical applications. At WaterDiam we produce diamond for its unique electrochemical properties. The diamond deposited on our silicon electrodes has the peculiarity, when used in our electrolysis equipment, to produce on its surface a unique combination of oxygen species, active ingredients and unique Oxido & Reduction Potential at neutral pH.

Waterdiam's "Water 3.0" is a new generation of water that offers unparalleled benefits for human, animal and plant health. We have tested it on more than a million animals, performed 14 scientific studies and are currently evaluating it on a 120 human patient trial and with some elite thoroughbred racehorses in Ireland together with leading trainers and breeders.

<http://waterdiam.com>
<https://twitter.com/waterdiam>

**Maxine Franklin, Director,
AGMA Holdings**



AGMA Limited, by Appointment to Her Majesty the Queen since 1982, Manufacturers of Cleaning & Hygiene Products, has been developing, formulating and manufacturing Speciality Chemical products in Northumberland for over 50 years. We currently export almost 50% of our production to more than 32 countries worldwide and are recognised experts in the formulation of cleaning and biocidal solutions for a broad range of professional end users including the NHS.

The Stablemate by AGMA Equine product range has been designed & developed by our team of Chemists & Microbiologists to be regulatory compliant, cost effective, convenient & easy to use. The range includes the high quality, pine based detergent cleaners BOXFRESH & STABLECLEANSE specifically developed for use in high soil, high traffic areas. DIS-IN-FECT is a compatible DEFRA approved, BPR supported, broad spectrum disinfectant that has been scientifically proven in independent research to kill Strangles and Ringworm plus EQUAROMA a unique, calming and uplifting Re Odourant for the equine indoor environment. Several other products are being brought through the research & development pipeline and the STABLEMATE range will be expanding. stablemateagma.com
twitter.com/maxinefranklin1

**Edward Dutton, Independent
Researcher**



Edward Dutton is an independent researcher based in Oulu in northern Finland. Born in London in 1980, Dutton read Theology at Durham University, before completing a PhD in Religious Studies at Aberdeen University in

2006. This was developed into his first book: Meeting Jesus at University: Rites of Passage and Student Evangelicals (Ashgate, 2008). He was made Docent of the Anthropology of Religion and Finnish Culture at Oulu University in 2011. In 2012, however, Dutton made the move to evolutionary psychology and has never looked back. Dutton has published in leading psychology journals including Intelligence, Personality and Individual Differences, and Journal of Biosocial Science. Dutton's other books include: Churchill's Headmaster: The 'Sadist' Who Nearly Saved the British Empire (Manticore Press, 2019); (with Michael Woodley of Menie) At Our Wits' End: Why We're Becoming Less Intelligent and What It Means for the Future (Imprint Academic, 2018); and How to Judge People by What They Look Like (Thomas Edward Press, 2018). Dutton's research has been reported worldwide including in the Daily Telegraph, The Sun, Le Monde, and Newsweek. Dutton can be found online at his award-winning channel 'The Jolly Heretic.'

EdwardDutton.wordpress.com twitter.com/jollyheretic



Daniel Ferland, Ossicles Inc

Daniel is a career sound recordist and great horse lover. Inspired by noise attenuation technologies that already exist for humans, Daniel first designed, with the help of audiologists, plugs that

hug the walls of the horse's ear canal. Result: thanks to internal and external microphones placed inside the eQuiet, the noise the animal hears is reduced by 20 to 40 decibels (dB), compared to approximately 5 dB for traditional plugs. At the same time, Daniel Ferland decided to include a GPS, an accelerometer and a gyroscope to measure the horse's performance, but more importantly, he inserted biometric sensors to measure vital

signs. "By having access to data like heart rate, respiration or body temperature, an owner or veterinarian could detect abnormalities even before symptoms of a health problem appear. ossiclestech.com

Mike Payton, Event Log Limited



Mike started his career in industrial marketing with steam engineering giant Spirax Sarco and Burkert Fluid Control Systems. Thereafter, he moved to become Marketing Director for an economic development consultancy and a portfolio of SME focused Venture Capital funds. As an accomplished B2B marketing expert, Mike ran a leading international development aid business division and became a specialist in partnership building and competitive tendering across international markets.

EventLog have the skills, pedigree, know-how and capacity to design, build, deploy and support apps and web based technology solutions for a range of applications within the equine industry. It is our goal to support the modernisation of the equine industry and to provide technology solutions to regulators and racing administrators, bloodstock auctioneers, trainers, owners, studs, vets and equine welfare bodies across the world. Beyond this, we also work in other racing sports such as greyhound racing and take a keen interest in the overall subject of anti-doping in sport. <http://www.eventlogequine.com/>

Paul Jones, Founder, PJ Copywriting



As a copywriter with 7 years' experience, I help clients generate sales and connect with their audiences through creating content that highlights the value of their products/services and communicate their brand's unique story. The services I offer

include: e-books; whitepapers; case studies; press releases; and website content writing. Areas of interest include digital health and wearable technology, HR, luxury watches, and motorsport, especially Formula 1.

<https://www.pjcopywriting.com/> <https://twitter.com/pjcopywriting>



**Keith Johnson, President,
AmTote International Inc**

Keith Johnson joined AmTote in 1989 as a part-time technician employee having just earned a BSBA degree in Marketing from Auburn University. Embracing the racing & wagering industry that his family had decades of roots in, Keith quickly moved into a full-time position and has progressed at AmTote from the ground up, gaining extensive industry knowledge and experience within multiple departmental positions including field operations management, hub operations management, regional operations management, sales & marketing, and executive leadership positions. Keith was promoted to President of AmTote in 2016. <http://AmTote.com> <https://twitter.com/amtoteint>

**Dr Bill Andrews PhD, Founder &
CEO, Sierra Sciences Inc.**



Bill is a scientist, athlete and executive who is known for pushing the envelope and for challenging convention. He has been featured in Popular Science, The Today Show, and numerous documentaries on the topic of life extension including, most recently, the movie The Immortalists in which he co-stars with Dr. Aubrey de Grey. See www.theimmortalists.com/watch. Bill has been a medical researcher in biotech since 1981, focusing on cancer, heart disease, and inflammation research, though his passion has

always been aging. In the early-to-mid 1990s, while at Geron Corporation, Bill led the research to discover both the RNA and protein components of the human enzyme called telomerase. This enzyme is responsible for preventing telomeres from shortening in human reproductive cells, and this is why our children are born younger than we are even though they come from our old cells. Inducing this enzyme to lengthen telomeres in all our cells, not just our reproductive cells, to reverse aging and declining health due to aging, is the principal goal of Sierra Sciences.

SierraSciences.com

**Shawn Wilkie, CEO,
Talkatoo**



Talkatoo.com

**Andrea Banchio,
Equine Vet & Consultant,
Sisteck**



FoalingAlarm.net

**Sharon Quigley, Founder,
Pythagoras Institute of Sound &
Vibrational Healing**



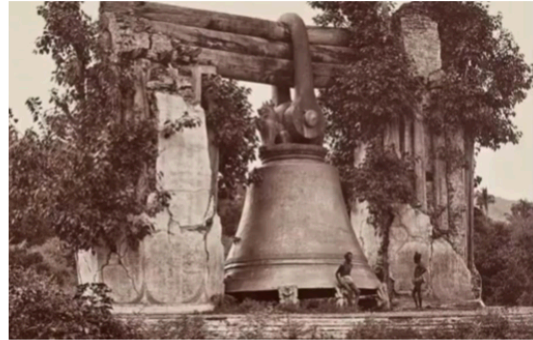
<https://pythagorasinstitute.com>

New chapters coming soon...

CULTURE



FREQUENCY MEDICINE



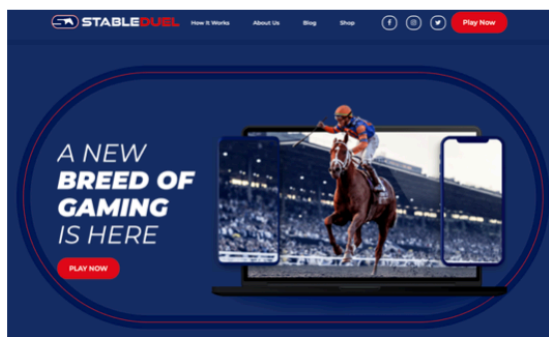
HYDROGEN THERAPY



CLONING



GAMING & ENTERTAINMENT



DERMATOLOGY



New chapters coming soon...

ANTIBIOTIC STEWARDSHIP



ENVIRONMENTAL TOXINS



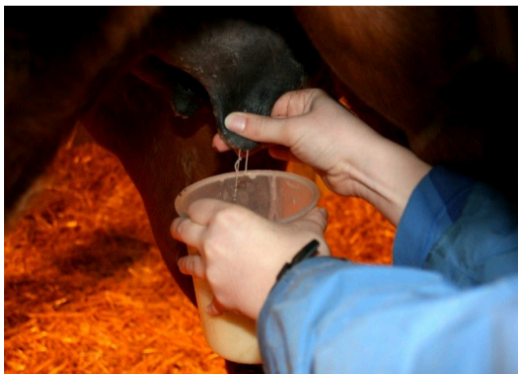
NEUROSCIENCE



TRANSDERMAL DELIVERY



TRANSFER FACTOR



BREEDING



New chapters coming soon...

PETH



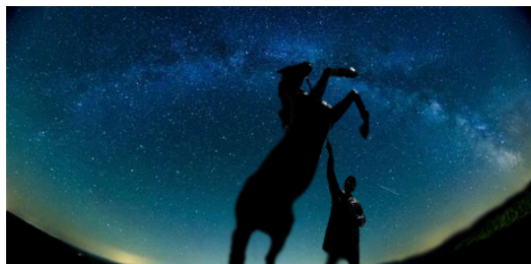
INTEROCEPTION



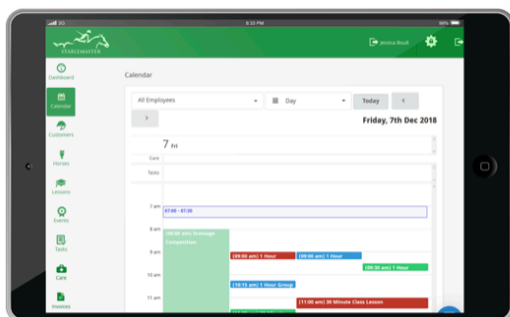
3D PRINTING



ASTRONOMY



STABLE MANAGEMENT



PLASMA THERAPY



New chapters coming soon...

FASCIA SCIENCE



ELECTROMAGNETICS



ANCIENT WISDOM



HORSETECH: A PARENTING HACK



YOUR **BIG** IDEA?