

HIGH-TECH

FOR THOUSANDS OF YEARS, humans have partnered with horses, and there's pride and honor in heritage and the old way of doing things. As an industry, things have evolved comparatively slowly. The saddles, tack and leather boots we use now are similarly made to how they were in the 1800s. Medieval blacksmiths would easily recognize our horseshoes, and bits and spurs passed down through generations are still used on a daily basis. But recent technological advances offer myriad ways to make horses healthier, alert owners to injuries or illness, detect subtle lameness, track training and fitness, and even help us try to outsmart Mother Nature.

Technology advances at a furious pace in the human world, and many products are becoming available for equines, as well. Products that utilize cellular telephone capabilities and applications (apps) can collect subtle bio-data from horses, utilize complex algorithms to evaluate the data, and then make recommendations or alerts based against the horse's "normal" profile. While it may sound like something out of a science fiction movie, there are products coming on the market that can give horsemen insight into our animals in new and useful ways.

From wearable devices to smartphone apps, tech products are being developed to improve the lives of horses and horsemen.

By Robin Volkering

Health and wellness

Sensors that can read and track data are at the forefront of many new technologies. Some are designated for safety alerts or veterinary monitoring, while others are used in fitness and training applications. Nightwatch and VetCheq are two tech products that can monitor a horse's vital signs and use algorithms to indicate when the readings deviate from normal, which could indicate a problem. Seaver Horse's Smart Girth Sleeve is a wearable tack enhancement that includes sensors used during rides, and Limb Bit is a lameness detection system. So depending on your purpose in collecting the data, there are a few different options with appropriate helpful technology.

Nightwatch is basically a "smart halter," with sensors housed in a leather halter or neck collar. It is designed to be left on a horse

day and night, and monitors heart rate, respiratory activity, motion and posture. Jeffery Schab, a biomedical engineer, developed the Nightwatch after his show horse died overnight due to fast-acting colic.

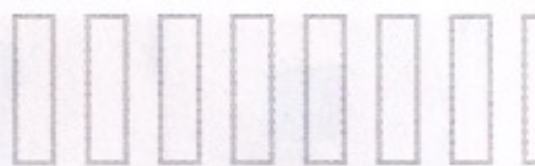
Since 2013, Nightwatch has been honing in on the best ways to alert someone if a horse has become cast, is potentially colicking or is stressed and needs assistance. Using GPS, cellular,



Nightwatch is available as a halter or horse collar. With regular use, the program will determine a "normal" range for each horse's vital signs and will alert you to deviations in a horse's regular signs.

The data accumulated by Nightwatch can be accessed via a smartphone.

Horse HELP



Wi-Fi and ultra-wideband impulse radar technologies (similar to sonar), the unit collects biometric feedback. By measuring the physical displacement of the microvasculature behind the horse's ears and changes in the soft tissue of the upper respiratory tract, the device can make accurate and ongoing assessments of the heart rate and respiration. The Nightwatch product needs Bluetooth or Wi-Fi to collect data, as it can use integrated cellular technology to upload data to a cloud, where it can be accessed by computer or cell-phone.

"I wanted to utilize my experience in the human medical realm to develop a product

to bring objectivity and science to the horse world, as well as attempt to save equine lives," Schab said. "We can't be with our horses 24/7, but Nightwatch can. By us getting an early alert, hopefully our horses will be able to receive veterinary assistance in time."

An individual horse's profile becomes more precise and accurate as the Nightwatch unit is worn an increasing number of hours. The unit will determine what is normal for a horse – "Lucky," according to his unique data, typically only lies down for 10 minutes at a time – and will take out random stress indicators such as an elevated heart rate due to a cat tipping over a bucket in the barn aisle. The application then utilizes advanced algorithms to compose an Equine Distress Index (EDI) score composite. When an animal's EDI goes outside of his normal range, an alert can be sent via phone call, text or email to up to five people, either all at once or in a pre-set hierarchy.

Ease of use was a major consideration in product design for Nightwatch devel-

opers. Since the halter should be worn as much as possible, the battery lasts for up to five days, and is easily and quickly recharged in less than three hours. Nightwatch is expected to be on the market by the end of the year.

Like Nightwatch, VetCheq was developed as a result of a tragic situation – the death of a young rider. VetCheq founder Sharon Caswell wanted to use her background in software engineering and medical device design to develop a product that could collect a horse's vitals in order to make an informed prediction of future actions. Typically used in a boot on the leg of the horse, VetCheq is an FDA-approved device marketed for veterinarians, rehabilitation clinics and professional training barns. It monitors 250 records a second with diagnostic-level quality, including cardiac function, blood pressure, pulse, respiration and EKG-equivalent data. VetCheq's technology is so accurate, it can replace an arterial catheter and be used during an MRI.

After collecting data for a particular horse, algorithms develop a threshold that can be used to monitor pain management, medication efficacy, stress levels, endurance or fitness, and more. The readings can assist in observation of animals during rehabilita-



Nightwatch can help horsemen rest easier at night, when receiving an early alert to potential problems can be a lifesaver.



VetCheq is designed to aid veterinary hospitals, rehabilitation facilities and large training barns in monitoring horses.



VetCheq is accurate enough to be used during veterinary surgery to monitor a horse's condition.

tion and treatment, noting when medication needs to be dosed, which medication or treatments are most effective, how the horse is responding to hauling, training or competition stress, and which treatments or training regimes are the most effective. It can also be used to monitor mares before and after foaling.

Setting up a baseline for each horse makes it easier to scientifically know when there is a change in vitals, which can signal a potential problem well ahead of visual observations. In the case of conditioning, it allows a trainer to know which programs are the most effective. When the horse passes over a pre-set

threshold, a text or audio alert can be sent to as many people as needed. Your veterinarian also has the capability of accessing real-time or historic readings via the internet.

Sensitive electronics are often not long-lived in a barn environment, but Caswell said, "Users don't need to worry about VetCheq, as the units are made to military-grade standards for water and dust resistance, and shock protection, and have been thoroughly tested in many of the top veterinary hospitals in the country."

Many new products utilize apps on smartphones and tablets, and there are a few that can really be useful when it comes to taking care of horses. Horse Side Vet Guide is one such product.

How many times have you stood next to a horse, observed a potential problem and wondered if you needed to call the vet while

running potential and increasingly terrifying diagnoses through your head? Doug Thal, DVM, developed Horse Side Vet Guide, an app that can help owners with veterinary health concerns. He began working on the project in 2011 after noticing that, with the advent of the smartphone, his clients were relying on "Dr. Google" to research ailments on their own. They were often getting misinformation from dubious sources, and sometimes, even delayed calling a veterinarian because of it.

Thal said, "By using flawed internet logic, my clients were wasting time researching ailments that were not afflicting their horses and even jumping to conclusions worse than what was actually happening."

He reasoned that because people have their phones with them most of the time, he would develop an app with veterinarian-curated information that horse owners could have immediately available, whether they were at a show, in a stall with an ailing horse or on a trail ride. The resulting database is extensive and includes custom interactive anatomical drawings, how-to videos, photos, links and more, all in one easy-to-remember location.

The Horse Side Vet Guide is meant to assist an owner in making informed decisions and be a first-line resource at the scene, not to replace veterinary input. Thal sees the app as a relationship-building tool between the veterinarian and the client, partnering to increase education and ensure the optimal health of the horse. The app can help make the best use of a veterinary appointment by preparing the owner ahead of time and providing additional information afterward.

Ever evolving, Horse Side Vet Guide contains concise information on common equine health problems to rare diseases, veterinary diagnostic tests and treatments. The database is searchable by observations rather than perceived diagnoses, so it lessens the chance of following an incorrect tangent. Currently there are more than 700 potential situations in the database and greater than 1,000 diagnoses, and they link to outside resources that add to the usefulness and educational value of the program. How-to videos and tutorials can teach horse owners how to perform tasks such as controlling bleeding with a lower limb pressure bandage or taking a digital pulse. There is even information on common brand-name



The Horse Side Vet Guide app can help you decide if and when a veterinary visit is needed, especially when it comes to after-hours emergencies.



In addition to diagnostic help, the Horse Side Vet Guide offers a multitude of educational articles, graphics and video tutorials for horse owners.



Coming in early 2017, Seaver Horse has developed girth sensors that collect data as you ride.



LimbBit uses Bluetooth technology to upload data from the sensors to the customer's smartphone.



LimbBit's smooth rubber sensors track your horse's movement, allowing you to identify subtle changes in your horse's gait.

pharmaceuticals and products.

Once the Horse Side Vet Guide is installed, most of the knowledge base is saved on the device, meaning that cellphone or internet reception is not needed to access information. That is key when you're in a location that lacks reliable data service. On your computer, the Horse Side Vet Guide offers thousands of articles to explore from trusted third-party resources, including the American Association of Equine Practitioners and various universities. The Horse Side Vet Guide has been downloaded in 65 countries, and the corresponding website is free to use.

Training and performance

From a fitness and performance perspective, sensors can monitor heart and respiratory rates to discover how the horse's fitness is improving over time. Built-in GPS can measure acceleration, path, and maximum and average speeds. Seaver Horse, a French company, has combined these technologies in the Seaver Horse Girth Sleeve, which can be used with any cinch or girth in any discipline.

The neoprene sleeve has five sensors in the center, including a gyroscope and an accelerometer, protected by a carbon fiber cover.

After collecting data during a ride, you can upload the data via Bluetooth to a cellphone app. Up to five horse profiles can

be set up, and like the previous products, the more the unit is used, the more accurate each horse's profile will be.

By analyzing data from multiple rides, trainers and riders can develop more defined training and fitness programs, as well as analyze the trajectory of courses and patterns to see where a horse may have been faster or slower, or where the approach to a barrel or jump wasn't optimal. The sensors can collect data on how long each foot was on the ground for gait analysis, which has lameness and training implications depending on discipline.

According to Seaver's public relations manager, Danielle Haywood, the company's products went through two years of testing by a variety of riders. After a highly successful Kickstarter funding round, Seaver Horse products are expected to be available worldwide early next year.

Lameness is the most common problem with performance horses. Seeking a way to assist his clients, J.D. Conway, DVM, strapped a smartphone to each leg of a horse and experimented from there, developing the LimbBit. Focused on early lameness detection, LimbBit utilizes level accelerometers, GPS and the physics of movement to detect subtle differences in movement – from leg



LimbBit comes with four sensors that are used in conjunction with a horse's existing splint boots.

to leg and from day to day – that are not detectable by just watching a horse move. With equine comfort in mind, the sensors are housed in four extremely lightweight, small, smooth “river rock”-like units encased in sweat-proof smooth rubber. The units are placed into splint boots and don’t need to touch the skin to gather data.

The LimbBit is easy to use. Simply open the app on a smartphone and program a profile for a particular horse. Turn on the four LimbBit units and sync them to the phone, then place them inside the horse’s splint boots. Trot the horse about 100 yards to gather data, then utilize Bluetooth to upload the data to your phone.

After 10 readings, the program will then develop a “normal” pattern of gait for that horse, after which a variance can be set. When LimbBit is used twice a week, a yellow, orange or red warning will appear if the horse has deviated from his normal gait pattern, alerting the owner to a potential problem. The LimbBit system can be used for multiple horses, each with its own profile in the app.

Rob Hendrickson, marketing director for LimbBit, said the product was developed as an “early detection device to help horse owners and competitors quickly assess when a horse is having subtle lameness issues before they become a potentially career-ending injury.” The LimbBit is available for pre-order and will be on the market at the end of the year.

In other areas of wearable technology, Equilume helps outsmart Mother Nature when it comes to equine reproduction. Seasonal light affects horses in many ways. For breeding purposes, a January foal should be bigger, stronger and more mature than a spring or summer foal, and for show horses, a short haircoat is much easier to manage than a thick winter coat. But nature sometimes conflicts with those desires, and winter’s short daylight hours are not naturally conducive to a mare ovulating in time to get that early foal. After many years of research into artificial daylight, Dr. Barbara Anne Murphy realized that with a specific type of blue light, she could inhibit a mare’s melatonin production and increase reproductive hormones.

Using this research and the resulting tech-

equilume™
precision blue light therapy

Benefits of the Light Mask

- Advances the breeding season
- Prevents prolonged gestation lengths
- Increases average foal birth weights
- Permits outdoor maintenance for happier, healthier horses
- Reduces stabling costs
- Improves coat condition for sales/competition
- Optimizes stallion performance early in the breeding season
- Patent pending



Equilume will provide a convenient alternative to putting mares under lights in preparation for an early breeding season. —

Technology can help analyze a horse's vital signs, then use that scientific information to protect them.

nology, her company developed Equilume, a wearable mask that contains a battery-powered blue light housed in an eye cup that can stay on a broodmare for an entire breeding season without needing to be recharged. When the unit is activated, the blue light turns on automatically after dusk for seven hours, simulating longer days. In show horses, the light stimulated the production of the hormone prolactin, which regulates the springtime shedding of the winter coat. Within weeks of utilizing an Equilume mask, a horse will start to develop his slick summer coat. As the masks are comfortable and adjustable, they can be worn 24 hours a day and during turnout.

While the horse industry is steeped in tradition and there is much to learn and appreciate from the past, rapidly evolving technologies have made amazing, affordable and easy-to-use tools available to horse owners, breeders and trainers. Technology can help analyze horses' vital signs, then use that scientific information to protect them, ascertain potential lameness or illness, and monitor their health and fitness, even when their owners aren't with them. In the future, these and other emerging technologies will help keep horses healthier and assist people in making better decisions for their training with the tap of a finger on a smartphone. The horse world is truly becoming high-tech. ★