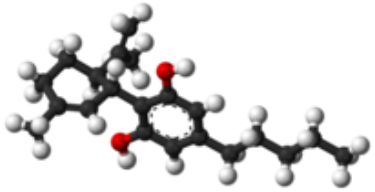
CBD USE IN THE EQUINE ARENA

Introduction to CBD

Cannabidiol (**CBD**) is one of at least 113 active cannabinoids identified in cannabis. It is a major phytocannabinoids, accounting for up to 40% of the plant's extract. CBD is considered to have a wide scope of potential medical applications. A large number of clinical reports have shown the lack of side effects, particularly a lack of psychoactivity and non-interference with several psychomotor learning. This is demonstrated by physical skills such as movement, coordination, manipulation, dexterity, grace, strength, speed and psychological functions



Cannabidiol is not scheduled by the Convention on Psychotropic Substances, since CBD does not cause the "high" associated with THC in marijuana. As the legal landscape and understanding about the differences in medical cannabinoids unfolds, it will be increasingly important to distinguish “medical marijuana” (with varying degrees of psychotropic) from “medical CBD” (in which the high CBD and low THC content may mitigate psychosis).

During recent years, there has been considerable legislative activity throughout the United States with respect to legalizing the agricultural production of industrial hemp, from which CBD can be extracted. To date, approximately 11 states have legalized industrial hemp production, including: California, Colorado, Indiana, Maine, Montana, North Dakota, Oregon, South Carolina, Vermont, West Virginia, and Tennessee. Another six states have put approval for the use of recreational marijuana on the ballot for election day. Many other states have passed legislation authorizing the cultivation of industrial hemp for pilot projects or studies, including Connecticut, Delaware, Hawaii, Illinois, Kentucky, Nebraska, and Utah. Additionally, the National Association of State Departments of Agriculture and the National Conference of State Legislatures have both adopted resolutions supporting revisions to the federal rules and regulations authorizing commercial production of industrial hemp.

Application - Efficacy and Safety

CBD (Cannabis) has been used for medicinal purposes for centuries and can be traced back to early use in ancient civilizations in China, the Netherlands, Greece and several other countries throughout the world. Recently, there is a world-wide renaissance of research into medical application of cannabis and the resulting subsequent product development. An increasing number of scientists from different medical disciplines have begun to document its application in many different medical fields, human and animal, with a focus on effectiveness and safety. LiveWire Ergogenics ’s research team, supported by its high-caliber advisory board of equine experts, is focusing on the application of CBD for horses.

> Veterinarians do need to be part of the dialogue. We should be kept in the loop in terms of translational medicine aspects. I can see a well -designed, controlled clinical trial looking at the use of marijuana to treat cancer pain in animals. That would be a wonderful translational study with relevance to both animals and their people.
>
> *Dr. Dawn Boothe, Clinical Pharmacology*
> *Laboratory director, Auburn University*
> *College of Veterinary Medicine*

This trend is supported by some 13,000 journal articles on cannabinoids and more than 1,500 on cannabidiol (CBD) specifically. [1] This includes scientific studies conducted by Universities and private companies, many of them presenting evidence for cannabinoids' efficacy in a variety of applications, including animal models. The potential for anti-inflammatory and bone-stimulant applications of these phytochemicals is considered significant for both humans and animals.

In an extensive review in 2011, CBD has been found to be non-toxic with very few, if any, side effects [2]. To gain a deeper understanding of the potentially addictive properties of cannabis, it is important to differentiate THC from CBD. Marijuana (mildly addictive) has high levels of THC. Hemp, on the other hand, has low THC and high CBD, and is neither mentally nor physically addictive. Many studies have reported that CBD produces psychostimulants in people and animals. [3] While there are always opportunities for new research, the list of applications is consistently growing, and currently available peer-reviewed journal articles already provide great insight into the relationship between CBD and animal health.

LiveWire Ergogenics R&D Objectives

LiveWire Ergogenics is commencing with research into the effectiveness of treatments derived from cannabinoids (CBD) for several under-investigated conditions. The selected sectors promise good opportunity for broad support, expanded research and the development of viable products that have the potential to generate significant revenues over time. This white paper is meant to provide an executive summary outlining the potential application of CBD in the equine arena. LIVEWIRE is planning to protect the intellectual properties resulting from its research via copy right and patent applications.

In the embryonic CBD equestrian market, it is critically important for a product's long-term success to establish the credibility of the research team and development approach. The research must demonstrate that high-quality and pure extracts of CBD can be efficiently produced and delivered, and the safety of its application is guaranteed. This is the focus of LiveWire Ergogenics 's research and development and the company believes that there is significant opportunity to capitalize on the existing need in the legal over-the-counter market for such products in the targeted market segments.

LiveWire Ergogenics has been expanding its corporate management team and is in the process of establishing an experienced and highly qualified research team and expert advisory board to explore opportunities for medical applications of cannabis in the equestrian arena, especially for high-performance horses in the hunter/jumper and dressage sectors. LiveWire Ergogenics is pursuing strategic partnerships with experienced veterinarians, high-level

[1] US National Library of Medicine and National Institutes of Health
[2] US National Library of Medicine and National Institutes of Health
[3] Journal of Neuroscience

equestrian trainers and athletes, medical research departments of local universities and other leading industry experts to commence with and expand research in this newly emerging industry sectors

CBD and Animal Health

The Company plans to advance its initial research into clinical trials for the application of CBD in the animal health sector, focused on the high-performance equine sector and subsequently develop innovative and high-quality products serving this sector.

- Expand and accelerate the research and branding of CBD and its impact on inflammatory and analgesic symptoms in domestic animals with a focus on equine applications.

- Establish an experienced and high-standard research team and advisory board of well recognized equine trainers, veterinarians and athletes, to supervise and advise on the LiveWire Ergogenics research studies.

- Partner with regional universities and research centers to invest in transparent studies on the impact of phytocannabinoids and their synthetics on the endocannabinoid system and subsequent product development.

APPLICATION IN THE EQUINE ARENA

High Performance Horses

Hemp's traditional use as a healthy, beneficial oil dates back to the Ming Dynasty and suggests that many horses, especially those involved in athletic activities such as racing, eventing or dressage, experience joint problems, digestive complications or allergic skin conditions. Those conditions are likely to benefit from a supplement of optimally balanced Omega oils and other ingredients, as found in hemp (CBD).

Based on current studies, CBD seems well positioned to ease joint pain and inflammation, support cardiovascular health, reduce muscle glycogen depletion and fatigue, improve the condition of skin, coat, hooves, and tail, and act as a digestive aid for horses, especially high-performance horses in eventing and dressage.

Joint Inflammation

One of the most prevalent conditions that affects the health of high-performance horses is the sensitivity and vulnerability of joints and arthritis. High performance horses are typically treated with regular joint injections by a certified veterinarian throughout their life time, an involved and high-cost procedure. CBD has the potential to support those treatments, or potentially replace them all together with a more holistic and more cost-effective

approach. CBD can act as both an immunosuppressant and anti-inflammatory, protecting joints against severe damage and inhibiting the release of factors that cause joint inflammation and destruction.[4]

Anxiety

Horses are flight animals. Separation from their owner or home, unusual and loud noise, sudden visual intrusions and fear of unusual situations or encounters are all common sources for anxiety in most animals, especially in high-performance horses. This anxiety can often result in uncontrolled flight and/or serious injuries. Just like anxiety in humans, anxiety in horses can be disruptive, result in dangerous situations for horse and rider, result in serious inquiries and diminish the horse's quality of life, athletic function and performance in competition.

Areas of the horse's brain involved in mood, stress, and fear are rich in cannabinoid receptors called CB1 receptors. These receptors help mediate fearfulness and anxiety. If these CB1 receptors are blocked or deficient, it can cause people or animals to become fearful or anxious, sometimes constantly. Cannabinoids help by creating a calming (or anxiolytic) effect by boosting these CB1 receptors in the brain.

Many studies have shown that CBD has similar effects on anxiety as approved drugs often administered by veterinarians and doctors to treat anxiety. A 2014 review by the Brazilian Journal of Medical and Biological Research [5] concluded that "the anxiolytic and antipsychotic properties of CBD stand out. CBD's anxiolytic effects seem to be similar to those of FDA approved drugs to treat anxiety. Cannabinoids have neuroprotective, anti-inflammatory, and antioxidant properties that could be important in protecting nerve cells.

Gastronomical Disorders

Both humans and animals, especially high-performance horses, suffer from a range of gastrointestinal disorders. Horse owners are often times confronted with the danger of severe cholics, a life-threatening condition, especially in high performance horses. Colic in horses is defined as abdominal pain and there are a variety of different causes of colic, some of which can prove fatal without surgical intervention. Colic surgery is usually an expensive procedure, often requiring intensive aftercare. Among domesticated horses, colic is the leading cause of premature death.[1] The incidence of colic in the general horse population has been estimated between 4 and 10 percent over the course of their lifetime. Clinical signs of colic generally require treatment by a veterinarian, often times surgery.

Several studies have shown that cannabis can be beneficial in the treatment of many gastrointestinal diseases. Because cannabinoids reduce gastrointestinal mobility and inflammation, they have been heralded as a new therapeutic strategy to treat gastrointestinal complications.

Pain

Cannabinoids can provide general, or specific pain relief for horses in three primary ways:

- Through CBD1 receptors in parts of the brain responsible for pain reception
- Through CBD2 receptors in peripheral nerve endings
- By causing other cells to reduce their release of inflammatory agents

[4] National Academy of Sciences, US

[5] Brazilian Journal of Medical and Biological Research

Several cannabinoids, including CBD, have been used to prevent neuropathy in animals. Because of their pain alleviating properties, cannabinoids have been used to treat bone injuries, which is one of the more complicated and painful injuries seen in high-performance horses [6].

General Wellness

As indicated by several different research reports, it seems obvious that cannabinoids are on track towards becoming vital tools in the fight against many different diseases and in maintaining animal/horse health, especially in middle-aged to older animals.

From anecdotal experience, Cannabinoids seems to have shown to combat aging, including weakening mental capacities and preventing anxiety, lack of appetite, inflammation and pain in animals, which leads to a positive application for horses as well.

LiveWire Ergogenics Research Team

The LiveWire Ergogenics management team has established a highly qualified research team and advisory board to explore the opportunities in this unexplored high-value sector. The LiveWire Ergogenics research team is in the process of establishing a high-caliber group of experts to support, accelerate and validate its research efforts. LiveWire is continuously expanding its research team, cooperation and advisory board to advance and accelerate its medical cannabis research in a substantial way. LiveWire Ergogenics has already attracted high caliber individuals from the medical and performance equine sectors and is currently exploring strategic relationships with the veterinary departments of leading local and domestic universities and medical facilities.

Equine Experts

LiveWire Ergogenics has established a high-caliber research team with some of the leading experts in the US performance equestrian field, consisting of a leading US veterinarian, a leading American Equestrian and Olympian and a team of extremely accomplished US equestrians, managing and training in one the leading equestrian facilities in California.

> “We have been searching for an all-natural, effective inflammatory supplement that is under FEI guidelines for decades. We are very excited to be a part of the LiveWire Ergogenics research and development on this potentially groundbreaking supplement”
>
> *The Equine Research Team*

[6] British Journal of Pharmacology

Dr. Rodrigo Vazquez - Equine Surgical Services, Inc. (ESS)

Dr. Rodriguez Vazquez founded Equine Surgical Services (ESS)in 2000. ESS is a sports medicine and surgical reference practice that operates out of the Helen Woodward Equine Hospital in Rancho Santa Fe, California. HWAC is a complete surgical and medical center and is equipped to perform the most advanced equine diagnostic medical and surgical procedures. The hospital is equipped with one of the only two swimming pool recovery systems for horses at the West Coast.

Dr. Vazquez has been at the forefront of stem cell/platelet rich plasma (PRP) surgery for horses, performing these procedures with a group of human perfusionists (Perfusion Concept, Inc.), led by Angela NAVA BA, CCP. Dr. Vazquez has been using bone marrow derived stem cells for the treatment of soft tissue injuries in high-performance horses, which has allowed world class athletes such as "Ravel", after what would have been a typically career ending injury, to return to competing and successfully place in the Beijing Olympics and win the World Cup in the United States. He works with all breeds of horses with emphasis on the dressage and hunter/jumper disciplines.

Dr. Vazquez has been a practicing veterinary medicine since 1987. After his internship at Escondido Veterinarian hospital he was awarded a scholarship, which allowed him the opportunity to attend the Masters Program of Preventive Veterinary Medicine at the University of California at Davis. After completing his Masters degree, he joined the equine internal medicine faculty at UC Davis. He then organized and directed the construction of the equine hospital, including a surgical suite and intensive care unit for the University of Baja California in Mexico. After completion of the construction and having taught at the facility for four years, he returned to UC Davis to complete an equine surgery residency. He received his board certification from the American College of Veterinary Surgeons.

Guenther Seidel - American Equestrian and Olympian

Mr. Seidel is an American Equestrian born in Germany. Competing for the US, he won medals in team dressage at three different Summer Olympics and competed and placed in two World Championships, as well as in seven World Cup Finals. The United States Equestrian Team (USET) also awarded him the Whitney Stone Cup as the individual who achieved a distinguished record in international competition, while also serving as an ambassador for the USET and equestrian sports. Mr. Seidel is well recognized globally and very active in the dressage community, training and giving clinics across the US. He also serves on the USEF Dressage Eligible Athlete Committee.

David Blake – Ridgeon-Blake Stables

Mr. Blake is a resident trainer alongside his wife at Ad Astra Stables in Encinitas, California. He has earned his USDF Bronze, Silver, and Gold Medals on a horse that he trained and has had multiple invitations to FEI Young Horse Championships that resulted in two wins one of which took him to the World Young Horse Championships at Werden in 2007. He has had multiple National and Regional wins and also received a grant to compete in Europe on his current Grand Prix horse at Hickstead, Muenster, and Lingen. He has trained several horses from young horses to Grand Prix and is on the USEF High Performance Rider list.

Rebecca Rigdon-Blake

Ms. Ridgon-Blake is a resident trainer along-side her husband at Ad Astra Stables in Encinitas, California. She has earned her USDF Bronze, Silver, and Gold Medals on a horse that she trained and has had multiple National and Regional wins. She has bred, raised, and successfully trained 3 Holsteiners to Grand Prix; as well as several others to Grand Prix from three to four-year olds. She was in the top 10 breeders of Dressage horses within the United States Dressage Federation for 5 years, was an auction rider for the Holsteiner Verband living and training in Germany and is a former USEF judge. She has had success at FEI Young Horse Championships and is on the USEF High Performance Rider list.

Research Facilities

LiveWire currently has two locations dedicated to pre-trial research. Its trial source material is produced at its 25,000 square feet licensed nursery and 450 acres Estrella Ranch in Paso Robles

Research Trials will be executed, and tests applied at Ad Astra Stables is a 14-acre tranquil High-Performance Dressage training facility with 29 stalls and lush grass pastures located in Encinitas, California by the LiveWire equine research team. The Resident trainers at Ad Astra are Rebecca Rigdon-Blake and David Blake.

Ad Astra Stables is also the home of As Astra Collective. The Ad Astra Collective is a group of five experts comprising of widely recognized FEI trainers, an accomplished World Champion, top Grand Prix and Olympic Riders, a high level USEF Judge and the owner of an exclusive and highly successful sales and training stable in the Netherlands.

The Collective creates a well-structured organization and utilizes a careful and highly selective approach to sourcing, acquiring, breeding and training internationally competitive FEI horses. The longstanding experience and track record of the Collective team is expected to successfully develop these horses into high-performance athletes, with the goal of competing at the World Cup and Olympic level.

Ad Astra, together with Dr. Rodrigo Vazquez's Equine Surgical Services will be the lead facilities for the LIVEWIRE equine research team for the practical application and testing of the products resulting from the LIVEWIRE research. The trials will be executed by the LIVEWIRE research team and managed and supervised by the LIVEWIRE Equine Advisory Board members.

To review, track and document the results of the LIVEWIRE team's trials, the LiveWire equine experts will utilize a video system that Ad Astra's farrier has set up to monitor a horse's range of motion in slow motion and real time. The research team will utilize this setup to establish baseline videos in a controlled environment and generate weekly progress reports, demonstrating the potential impact of CBD on certain medical conditions and in a tightly controlled environment.

Initial Research and Testing

LIVEWIRE and its research team will begin the research for its initial products by testing with a group of select horses that the research team has daily access to and is very familiar with. The team will each observe their changes/reactions via video, daily documentation of their mobility, agility and flexions, which will be documented and confirmed by the team's veterinarian Dr. Vazquez via pre-and post-treatments and X-rays to determine if there are any skeletal changes (positive or negative).

Pre-Clinical Studies

In LiveWire Ergogenics 's pre-clinical trials the team will begin collecting important feasibility, iterative testing and drug safety data. Successful pre-clinical studies may facilitate FDA approval, or further evaluation of the test article in clinical trials. LiveWire Ergogenics will follow the FDA required good laboratory practices (GLP), defined in medical product development regulations, for preclinical laboratory studies.

After establishing initial feasibility, both in vitro and in vivo tests might be performed. Studies of a products toxicity would include which organs could be targeted by that drug, as well as if there could be any long-term carcinogenic effects or toxic effects on the general mammalian health and reproduction.

These regulations set the minimum basic requirements for:

- Study conduct
- Personnel
- Facilities
- Equipment
- Written protocols
- Operating procedures
- Study reports

Usually, preclinical studies are not very large. However, these studies must provide detailed information on dosing and toxicity levels. After pre-clinical testing, the LiveWire Ergogenics researchers review their findings and decide whether the product should be tested further.

Expanded Research into the General Pet Sector

The LiveWire Ergogenics research team currently has no plans to continue its research into human applications. Nevertheless, the results produced in the initial research with horses may also produce valuable insights for application in the general pet sector.

Recent peer reviewed and published work in Frontiers of Veterinary Science, 2018 written by Joseph J. Wakshlag, DVM, PhD. Associate Professor, Sections of Clinical Nutrition and Sports Medicine and Rehabilitation, Cornell University shows clinically significant increases in comfort and activity in dogs using CBD twice daily. With a significant decrease in pain and no visible side effects during treatment, quantifiable results from research of this are quickly bringing to the forefront scientific results from what heretofore was speculation as to the efficacy of CBD on animals.

Cooperation with Leading Veterinarian Institutions

LIVEWIRE's advisory board has longstanding relationships with some of the largest veterinarian universities and Equine Hospitals in the country and is in the process to explore how these institutions can participate in the LIVEWIRE research and cooperate with the LIVEWIRE research team. This will be especially crucial in a more advanced development stage during the second phase of product trials.

UCDAVIS

As the top-ranked global leader in veterinary medicine, the UC Davis Veterinary Hospital treats more than 50,000 patients a year — from dogs and horses to mountain lions and iguanas. UCDAVIS faculty, staff and students provide attentive and personalized care to each animal, understanding that they are valued members of the family. Its world-renowned specialists have access to leading-edge equipment and technology and are equipped to handle 34 clinical specialties. These include 24/7 emergency and critical care, cardiology, internal medicine, oncology, ophthalmology and surgery, among others.

Rood & Riddle Equine Hospital is a full-service equine hospital established in 1986 as a referral center for horses requiring specialized medical and surgical care. Today Rood & Riddle is known and respected throughout the world for innovative and highly skilled treatment of horses. The hospital facility offers a full range of services including surgery, internal medicine, advanced diagnostic imaging, a focused Podiatry Center and specialized Reproductive Center. The practice also provides ambulatory services for emergencies, preventative care, general reproduction, radiography, medical care and treatment of horses at the Hospital's farm or stable. Its reputation stems from the unwavering commitment to quality, both in the care of horses and in the relationship with clients and community.

Wilhite & Frees Equine Hospital is a 100% equine facility located in Peculiar, just South of Kansas City, Missouri. The hospital provides services for the Kansas City Metropolitan area and beyond. The practice was founded 1998 by Dr. Wilhite and has a staff of five licensed and accredited veterinarians, two board certified surgeons and two interns.

The hospital is focused on competitive performance horses, pleasure horses and breeding animals. The facility provides lameness evaluations, purchase exams, sports medicine, intra-articular (joint) injections, dentistry, stallion and mare reproductive services, as well as general wellness care and preventive medicine. Additional services are portable radiograph (x-ray) machines and ultrasound machines for endoscopy, motorized dentistry and shockwave therapy.

Market Acceptance

In conclusion, LiveWire Ergogenics expects that based on the equine research team's decades of experience and highly credible track record working with high performance horses on the highest International and Domestic levels, it can expect conclusive research results within a reasonable time frame. The Company anticipates that products resulting from the LIVEWIRE research, would pass the required approval procedures and be very well accepted in the equine market.

This is expected to be particularly the case with the line of products that LiveWire Ergogenics plans to market addressing inflammatory ailments for horses recovering from injury, potentially in combination with other natural anti-inflammatory natural products, such as yucca.

To have access to the broadest possible market, the team will assure that the anti-inflammatory applications are legal with the United States Equestrian Federation (USEF) and the Federation Equestre Internationale (FEI) for

performance horses. The Company plans to take advantage of the conducted research in the equine field and adjust findings for application in the general pet sector.

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