

# EQUINE NEWS<sup>®</sup>

KENTUCKY EQUINE RESEARCH'S NUTRITION AND HEALTH QUARTERLY | VOLUME 8, ISSUE 2

**When Two Worlds Merge: KER  
and Academia Join Forces to  
Benefit Horses**

**Improving on the Best:  
Vessels Stallion Farm**

**Australian Endurance Riders  
Race to Silver in Dubai**



In conjunction with Ridley AgriProducts

*Congratulations!*  
*Australian Endurance Squad*

# Team Silver Medal

*World Endurance Championships*  
*Dubai 2005*



Mal Caldwell

Mal Caldwell



# EQUINEWS®

VOLUME 8 ISSUE 2

## CONTENTS

2

Kentucky Equine Research Feeds  
the Champions

4

Australian Endurance Riders Race to Silver in Dubai

7

When Two Worlds Merge: KER and Academia  
Join Forces to Benefit Quarter Horses and  
Thoroughbreds

12

Ground Line: Building a Base for  
Grand Prix Performance

14

Improving on the Best: Vessels Stallion Farm

19

Internship:  
Countdown to a Career

20

Questions & Answers

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# Kentucky Equine Research Feeds the Champions

**EVENTING.** Winsome Adante was named Overall Horse of the Year and also Eventing Horse of the Year for 2004 by the United States Eventing Association (USEA). The gelding, who has finished in first or second place in all but one three-day event in which he's ever competed, is sponsored by Kentucky Equine Research and Team Member Pennfield Feeds. Kim Severson, who rode the horse to individual silver and team bronze medals at the Athens Olympic Games, fuels her champion with Pennfield's Enduroevent feed. The USEA also recognized KER- and Pennfield-sponsored horses and riders for other impressive year-end totals. Bruce Davidson, Sr.'s mount Jam was sixth on the list for Mare of the Year and fifth among intermediate-level mares. Six of the top 11 names on the Rider of the Year list—Phillip Dutton, Kim Severson, Karen O'Connor, David O'Connor, John Williams, and Bruce Davidson, Sr.—are also sponsored by KER and Pennfield.


**THOROUGHBRED RACING USA.** Ghostzapper, record-setting winner of the 2004 Breeders' Cup Classic, was given the 2004 Eclipse Award for Horse of the Year. Bobby Frankel, a finalist for the Eclipse Award for Trainer of the Year, conditioned the five-year-old, who had won eight of ten career starts and earned close to US\$3 million by the end of the season. Ghostzapper was also named Top Horse in the World by the inaugural World Thoroughbred Racehorse Ranking Conference that convened in Hong Kong in December. Ghostzapper trained and raced on KER-formulated feeds produced by Team Member Hallway Feeds in Kentucky.

**BARREL RACING.** Kellie Hill is the equine specialist at KER Team Member Cooperative Plus, Incorporated (CPI) in Wisconsin, USA. In her spare time, she has spent the last year campaigning her Quarter Horse JNJ Dancin Leon in professional rodeo events. Kellie and "Leo" have been among the top finishers at the NBHA Wisconsin State Finals, the Barrel Bash in Illinois, World's Toughest Professional Rodeo competitions in Wisconsin and Minnesota, and PCRA Rodeo contests. Kellie feeds CPI 12% Special to give her horse the energy he needs for the strenuous training and travel involved in the active rodeo circuit. She says, "With Leo on CPI's Special Horse Feed, his coat is immaculate and he has outstanding stamina and recovery after all my runs."

**BUCKSKIN HORSES.** Karen Gauger-Bork, another CPI customer, showed Tina's Poco Blackburn to four Honor Roll titles and 71 American Buckskin Registry Association points last year. The mare is fed CPI 12% Special. This feed delivers a significant portion of its energy through soybean oil, an ingredient known to put an unbeatable shine on a horse's coat while delivering plenty of go-power for a busy show schedule.

**DRESSAGE.** Maryland resident JoEllen Hayden and her Dutch Warmblood gelding Happy Boy earned a Bronze Medal from the United States Dressage Federation. To qualify for the award, the pair amassed six scores of 60% or better, two each for tests ridden at first level, second level, and third level, from at least two different judges. Hayden believes that products developed by Kentucky Equine Research helped her horse give his best performance. "I started Happy on Bio-Bloom as soon as he was imported from Holland," she said, "and I could see the improvement as his hooves grew. I also count on Restore Electrolyte to keep my horse in top condition when he trains and shows in hot weather."

**STANDARD BRED RACING.** Standardbred Canada has given the O'Brien Award for Trainer of the Year to Joe Stutzman of Campbellville, Ontario. The award recognises individuals who have made the most significant contributions to harness racing throughout the season. Dominating week after week on the tough WEG circuit, Stutzman claimed 260 wins in 1218 starts for earnings of \$4,252,122. Stutzman uses Phase III, Pacemaker X, and Competition Plus, products supplied by Troy Vlaar, a dealer for Brooks Performance Feeds. Horses trained by Stutzman are fed four times a day to minimise chances of digestive upset, and their race records indicate this feeding plan helps them perform to their full potential.

Kentucky Equine Research congratulates these outstanding trainers, riders, and horses, and wishes them continued success. 

Do you have a champion that's being fed a KER-formulated feed? If so, contact us at [equivit@ker.com](mailto:equivit@ker.com) or 1 800 772 198, and we'll feature you on this page!

# Fuelling Champions Across the Globe

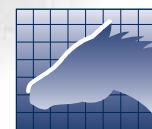
Kentucky Equine Research proudly congratulates Team Member Hallway Feeds for providing the feeds for Ghostzapper, winner of the 2004 Breeders' Cup Classic. Ghostzapper was also honored with the Eclipse Award for Horse of the Year.



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# Australian Endurance Riders

## Race to Silver in Dubai

Imagine seven, nine, or even eleven hours in the saddle with few breaks and nothing but miles and miles of desert stretching out in front of you, to the left of you, to the right of you, and, thankfully, behind you. Add in that much of this time is spent cantering and the feat becomes more intimidating, maybe even frightening. To experienced endurance riders, however, this is routine. But not routine in a mundane or dull way. Routine in an addictive way that stokes the collective fires of joy, passion, and exhilaration.

A quartet of endurance riders from Australia experienced these emotions and countless others as they secured the team silver medal at the World Endurance Championships, held January 27, 2005 in Dubai, the United Arab Emirates. The 160-km ride was held at Dubai International Endurance City, a venue built specifically to host long-

distance equestrian competitions.

The competition was sponsored by the Crown Prince of Dubai and Minister of Defence, Sheikh Mohammed Bin Rashid Al Maktoum, often considered the patron of endurance riding in Dubai and a well-known competitor. The sponsorship was profoundly generous, as Sheikh Mohammed paid for all of the competitors to be there.

Due in part to Sheikh Mohammed's benevolence, the World Endurance Championships had more competitors than any FEI-sanctioned world championship ever contested, regardless of discipline. Aside from the 175 riders, more than 750 support personnel and 42 officials were in Dubai.

Teams from 32 countries contested the event, but only four of those teams—from Italy, Australia, Belgium, and Canada—managed to finish three riders and earn team medal consideration. Italy claimed the gold medal and Belgium, a country with fewer than 300 total endurance riders, earned the bronze. Nine other nations sent individual riders.

### A Barren Backdrop, Blistering Times

In many ways, endurance riding can be a solitary sport. Training hours logged by riders are sometimes spent with only the horse beneath them as company. This holds true in many endurance competitions as well. While riders must be mindful of the condition of their mounts and the status of the terrain, they often rely on shifting scenery to keep their interest. Such was not the case in Dubai. Though the venue for the World Endurance Championship is undoubtedly one of the finest in the world, a sense of ennui arose in riders as they looped through the desert with an essentially unchanging view: sand, sand, and more sand. As expected, the "sandscape" proved quite barren when compared to more eye-appealing backdrops of other international endurance competitions.

Even the omnipresent sand, in spots, proved to be a point of concern. While the sand track was packed and graded to allow for easy passage, deep footing did crop up occasionally, particularly in a part of the course that most

*Members of the Australian Endurance Squad receive nutritional advice from KER and Ridley AgriProducts.*



Supplied by MegaMedia

riders crossed during the hottest part of the day (temperatures in the mid 20's with little breeze and full sunshine).

Because of the generally well-groomed, flat courses, scorching times were recorded. The winner of the race, Sheikh Hazza bin Sultan Al Nahyan of Abu Dhabi, crossed the finish line in a total riding time of 7:03:22, nearly 17 minutes faster than the World Endurance Championship record. In fact, the first four horses over the finish line (three from the UAE and one from France) all finished inside the previous world record time.

The quickness of the course caught many riders off guard. When some riders realised they were covering more ground than planned, in some instances going 4 or 7 kmph faster than originally thought, they began monitoring their pace more closely. Observation of speed is necessary to ensure horses are not at risk of overexertion early in the ride. Horses that covered the first stages of the course too quickly often did not finish.

## The Team from Down Under

The Australian team consisted of Peter Toft, Penny Toft, Jennifer Gilbertson, and Kristie McGaffin. Longtime KER-sponsored rider Meg Wade and Anne Jones rode as individuals. Each is a member of the Australian Endurance Squad (AES), an organisation formed two years ago to provide endurance enthusiasts with the opportunity to represent the country in international competitions. Squad members come from all levels—not just the upper echelon—with the common goal of excellence in competition.

**As is often the case in world-class competitions, Kentucky Equine Research (KER) was on hand to lend its expertise. KER and Ridley AgriProducts serve jointly as consulting nutritionists to the Australian Endurance Squad.**

As is often the case in world-class competitions, Kentucky Equine Research (KER) was on hand to lend its expertise. KER and Ridley AgriProducts serve jointly as consulting nutritionists to the AES. The companies' primary responsibility is to provide nutritional support and advice to riders throughout the year. Additional support is given leading up to and during international endurance events. Recognising the importance of the World Endurance Championships, the companies expressed further support by shipping feeds and supplements to Dubai to minimise disruption of the horses' diets.



*Meg Wade is a prominent member of the Australian endurance community. She rode as an individual at the World Endurance Championships.*

Scott O'Brien, an equine nutritionist with Ridley AgriProducts, travelled to Dubai with the team to offer technical assistance to the Australian team. Prior to the competition, O'Brien and Dr. Peter Huntington, director of nutrition for KER, travelled to Dubai to review local forages to ensure forage availability was adequate for the Australian horses. While in training, team horses were familiar with being turned out to pasture much of the time, a luxury that would not necessarily be afforded in Dubai. Quality of forage, therefore, became a prime consideration.

All of the team horses were fed a muesli-like sweet feed called StableMaster Phar Lap or a specialised pellet called StableMaster Endurance, both of which are manufactured by Ridley AgriProducts and formulated with the support of KER. Team horses were also fed Equi-Jewel, KER's stabilised rice bran product.

In addition to well-formulated concentrates and high-energy supplements, team horses were offered a combination of KER electrolyte products Endura-Max, Endura-Max Plus, and Restore. Antioxidant protection was afforded by Elevate and Preserve.

## THE UNITED ARAB EMIRATES

On the tip of the Arabian Peninsula lies the United Arab Emirates (UAE). Encompassing 83,000 square kilometres (compare this to Australia's approximate 7.7 million square kilometres), the UAE is a federation made up of seven emirates (an emirate is a state or jurisdiction under the rule of an emir, an Islamic chief or commander): Abu Dhabi, Dubai, Sharjah, Ajman, Umm Al-Qaiwain, Ras Al-Khaimah, and Fujairah. The population of the UAE is nearly three million. The capital and largest city of the UAE is Abu Dhabi, which is located in the emirate that bears the same name.

Dubai is likely the most recognisable emirate of the UAE. Certainly, it is the commercial centre of the federation, complete with its famed gold markets. More recently, Dubai has become an important stop in the trade route between the East and the West. Aside from the World Endurance Championships, which has been contested in Dubai on two occasions, the emirate plays host to the world's richest Thoroughbred race, the Dubai World Cup. The lure of these attractions has made Dubai a must-see destination for tourists.

Though Dubai is the most well-known emirate, it is impossible to discount the contributions of the others to the economy of the federation. Abu Dhabi is at the epicentre of the federation's oil resources. On a global scale, Abu Dhabi can boast 10% of the world's oil reserves. From an agricultural perspective, Ras Al-Khaimah and Fujairah take centre stage, primarily because each has better access to water than the other emirates.

Sharjah is considered the cultural capital of the UAE. It boasts impressive architecture in the form of museums and mosques (buildings used for public worship).

Despite being a relatively young federation, established in 1971, the UAE holds an important place in the economic and cultural landscape of the world. Too, the UAE is becoming home to some of the world's most prestigious equestrian events.

All four of the horses on the Australian team were prepared by Toft Endurance, an endurance empire run by Queenslanders and husband-and-wife team Peter and Penny Toft of Marburg, near Brisbane. For the championships, Peter was paired with his brightly colored Appaloosa Electra BP Murdoch, a horse that stands out among the crowd of bay, chestnut, and grey Arabians. Peter and the gelding have travelled far and wide to compete in endurance events. In 2003, the pair made the trip to the United States to contest the Tevis Cup, held annually in California. That trip proved rewarding as the pair finished fourth.

Peter Toft attributes much of the team's success to a proven scientific feeding program and unsurpassed veterinary support. In addition to these critical elements, Mother Nature lent a hand. Prior to the competition, the environmental conditions in Australia were similar to those that would be encountered in the Middle East, which gave the Australians an edge as well.

Penny Toft's mount for the international competition was Harriet. Unfortunately for Penny, the mare was eliminated due to lameness after crossing the finish line.

Jennifer Gilbertson resides in Wiseman's Ferry in New South Wales. She completed the world championship race on Bramall Jazzmin, another horse owned by Toft Endurance. Gilbertson's family supports her horse interests whole-heartedly. Her husband is a delegate to the Australian Endurance Riders Association (AERA) and helps

coordinate the 400-km ride held at St. Albans each year.

Gilbertson has been successful over the last several seasons. She placed among the top twenty finishers at a recent World Cup competition. She chooses a second-place finish in the 2003 Australian FEI Championship aboard homebred Webbs Creek Rippling as one of the most memorable rides in her career.

Kristie McGaffin was the final member of the silver-winning team. She and Bremervale Justice also placed 18th in individual competition. Bremervale Justice is owned by Peter Toft and was bred by his mother, owner of Bremervale, a well-known Arabian stud located near Brisbane. McGaffin hails from Walwa, a town on the border of Victoria and New South Wales.

The Australians have a rich tradition of performing well in world championship competition, having earned the team gold medal in France in 2000, and team bronze medals in 1994, 1998, and 2002.

Ridley AgriProducts is the largest stock feed manufacturer in Australia, selling the Barastoc and StableMaster lines of horse feeds. In 2003, Ridley AgriProducts released a new product, StableMaster Endurance, which was formulated specifically to support the nutritional demands of endurance riding. Learn more about Ridley AgriProducts feeds and sponsored riders at [ridleyhorse.com.au](http://ridleyhorse.com.au).

For more information on KER, log on to [ker.com](http://ker.com). 

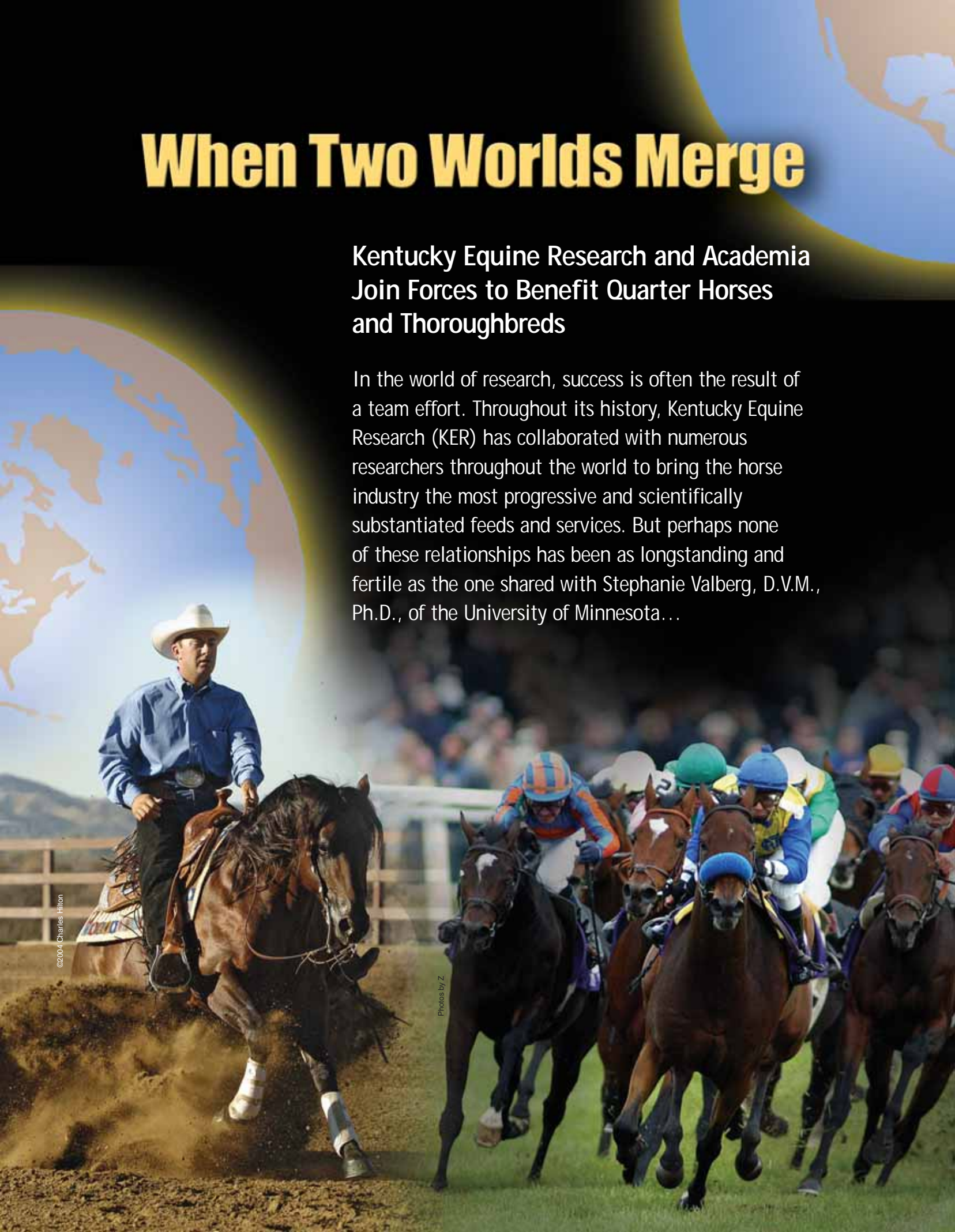
# When Two Worlds Merge

## Kentucky Equine Research and Academia Join Forces to Benefit Quarter Horses and Thoroughbreds

In the world of research, success is often the result of a team effort. Throughout its history, Kentucky Equine Research (KER) has collaborated with numerous researchers throughout the world to bring the horse industry the most progressive and scientifically substantiated feeds and services. But perhaps none of these relationships has been as longstanding and fertile as the one shared with Stephanie Valberg, D.V.M., Ph.D., of the University of Minnesota...

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Photos by Z



Joe Pagan, Ph.D., founder and president of Kentucky Equine Research (KER), first met Valberg in Sweden in the mid-1980s.

Dr. Sune Persson and Arne Lindholm of the Swedish University of Agricultural Sciences invited to their Scandinavian laboratory a group of scientists interested in studying exercise physiology in Standardbred trotters. The single piece of equipment that most attracted Valberg and Pagan was, in fact, a high-speed treadmill, a monstrosity built by Saab, the Swedish airline company. "At that time, there were no high-speed treadmills for horses in the United States, so Sweden was the mecca for people interested in equine exercise physiology," explained Valberg.

Unlike the noisy treadmills of today, the motor for that piece of equipment was housed in a separate building. A mat of woven coconut hair lined the belt and softened the blows of hooves, so little noise was produced when it was being used. Construction expenses preclude the widespread duplication of this uber-treadmill, but researchers worldwide maximised its use for several years. During their time at the Swedish University of Agricultural Sciences, Valberg completed her Ph.D. studies and Pagan finished up postdoctoral research. Eventually, each returned to the United States with a different focus.

While Pagan was laying the groundwork for a fledgling company called Kentucky Equine Research in the late 1980s, Valberg continued exercise physiology research. She began working under Dr. George Cardinet, a specialist in

neuromuscular diseases of animals at the University of California in Davis. Dr. Cardinet had invited Valberg to California with the expectation that she would develop an equine neuromuscular diagnostic laboratory, complete with biochemical analysis capabilities. She successfully accomplished that, and during her six years of study on the West Coast, Valberg identified two distinct muscle disorders, polysaccharide storage myopathy (PSSM) and recurrent exertional rhabdomyolysis (RER). Throughout those years, she became increasingly interested in the causes of the muscle disorders, specifically genetic and biochemical links.

Valberg was eventually lured to the University of Minnesota in 1994, due in part to the research work that was being done, oddly enough, on pigs. Some pigs are genetically predisposed to a condition known as malignant hyperthermia, which is not altogether dissimilar to RER. In addition, collaborations with biochemists and physiologists at the University of Minnesota allowed Valberg to delve deeper into PSSM. As her work at Minnesota progressed, Valberg was able to pinpoint that some horses, particularly those with Quarter Horse breeding, suffered from a condition characterised by excessive glycogen (sugar) storage and increased sensitivity to insulin within muscles.

If too much sugar was ending up in the muscle cells, Valberg figured that decreasing the starch content in the diet and substituting fat might help these horses. With this basic reasoning stirring in her mind, she reached out to Pagan, who by this time had solidified his reputation as a progressive equine nutritionist.

"I knew that Joe Pagan would design specific feeds for horses with specific problems, rather than simply using whatever was available," said Valberg. "Up to this point, we were decreasing the starch in the horses' diets, but we were doing it awkwardly. For owners of horses that needed more calories than roughage could provide, we'd advise them to pour corn oil over lucerne cubes. Not only were the rations not properly balanced but they weren't particularly palatable or easy to feed."

When asked by owners how to manage their PSSM-affected horses, Valberg's answer was brief: feed a low-starch, high-fat diet and offer daily exercise, including as much turnout time as possible. Rice bran, such as Equi-Jewel, combined with a ration balancer proved to be a successful way to manage these horses. The advice was effective, but only if it was followed exactly. All of the horses managed in a way faithful to Valberg's recommendations became free of tying-up episodes.

Taking the information she learned from her early work in Quarter Horses and other stock-type breeds, Valberg

*Dr. Stephanie Valberg has been at the forefront of equine muscle research for nearly two decades. Much of her work has been accomplished with cooperation from KER.*



Supplied by Stephanie Valberg

## A Closer Look at Polysaccharide Storage Myopathy

Exercise increases the risk of injury—there's no way around it. In Quarter Horse-related breeds, polysaccharide storage myopathy (PSSM) is a heritable muscle condition that strikes horses following light exercise.

Signs associated with PSSM include muscle twitching and cramping (including flank tremours), tucked-up abdomen, unusual sweating, a camped-out stance (posturing as if to urinate), gait asymmetry, hind limb stiffness, and reluctance to move. A horse may also exhibit signs typical of colic such as pawing or rolling after exercise. Frequency of episodes varies—one horse may have a few sporadic attacks over the course of a year, but another may be affected after each exercise session.

Definitive diagnosis of PSSM involves microscopic evaluation of the muscle. (See the sidebar titled "Mining for an Answer: Muscle Biopsies Help Researchers Discover Truth About Muscle Disorder" for a closer look at the biopsy procedure.) Researchers look for characteristic abnormalities in muscle cells including periodic acid Schiff's (PAS) staining for glycogen and polysaccharide, an abnormal sugar. The dark purple stains that indicate the presence of polysaccharide are the classic diagnostic feature of PSSM.

Based on the microscopic findings and pedigree research, a familial pattern for the presence of PSSM has been established in Quarter Horses, Paints, and Appaloosas.

PSSM resembles several syndromes in other species, including humans, that are characterised by excessive accumulation of glycogen in skeletal muscle. In these syndromes, glycogen collects because the muscles lack a specific enzyme that allows them to use glycogen as an energy source.

This did not hold true for horses, however. Horses were found to have all of the necessary enzymes to burn glycogen appropriately. The feature that sets apart PSSM from other syndromes is the unusually quick rate at which horses remove sugar from the bloodstream, create glycogen, and store it within muscle cells.

The prognosis for horses stricken with muscle problems caused by PSSM is promising. "Muscle has a remarkable ability to repair itself. After an episode of tying-up, the muscle cells usually heal completely in three to four weeks without scarring," explained Stephanie Valberg, D.V.M., Ph.D., an internationally recognised researcher who specialises in equine muscle disorders. "If the damage is severe, muscles may decrease slightly in size as the body filters out damaged proteins. Muscle mass usually returns in two to four months."

Management to prevent muscle pathology caused by PSSM involves adherence to a careful diet and exercise program. The first step is decreasing the amount of starch in the diet. This is most easily accomplished by eliminating all grains and sweet feed. In addition, horses benefit from a fat supplement. While a mixture of corn oil, lucerne pellets, and a protein, vitamin, and mineral balancer may work for some horses, Re-Leve is the ideal choice for PSSM horses. Developed by Kentucky Equine Research (KER), Re-Leve is a palatable low-starch, high-fat feed that contains complete vitamin and mineral fortification. Most commercially available high-fat feeds contain too much starch and too little fat for PSSM horses. While Re-Leve is not available in Australia or New Zealand, some alternatives are. Please contact KER (1 800 772 198) for further information.

The second step is implementation of a consistent exercise program that includes daily turnout and exercise under saddle. "In my experience, turnout is the single most important thing that can benefit horses with PSSM," said Valberg. "If PSSM horses are managed in a way that allows them to move about freely and graze for most of the day, it really decreases muscle soreness."



contemplated the mechanism involved in tying-up in Thoroughbreds. From a microscopic standpoint, she knew that the form of tying-up seen in racetrack Thoroughbreds was unrelated to unusual glycogen accumulation in muscle. She believed instead that it was due to an irregularity in the way calcium is regulated in muscle cells. Though some researchers believed that a buildup of lactic acid was the culprit in these tying-up episodes, Valberg and coworkers decisively dismissed that notion following a trial in which horses afflicted with tying-up revealed no lactic acid accretion whatsoever.

One of the first trials conducted by Valberg and her coworkers involved six Thoroughbred fillies, each with a history of tying-up. Valberg removed the fillies from the racetrack and relocated them to the University of Minnesota's research farm. After a three-month letdown designed to acclimate the fillies to their new environment, they were introduced to the high-speed treadmill and training regimes.

An unsettling problem ensued. Despite intense exercise on the treadmill, the fillies did not any show signs of tying-up. Things did not look promising, according to Valberg. However, when more starch-laden sweet feeds were given to the fillies and exercise continued, the outlook shifted completely. The fillies began to show clinical signs of muscle pathology, and all eventually tied up.

"The question then became what can I feed these jazzed-up Thoroughbred fillies to keep calories up and starch down," observed Valberg. The fillies required significantly more calories than what could be provided by top-dressing low-starch feeds with corn oil or rice bran. "That's when I called Joe and cried, 'Help!'"

KER responded with Re-Leve, a high-fat, low-starch feed that contributes the necessary energy, protein, vitamins, and minerals to the racehorse without the excitability and muscle problems associated with starch. Longtime KER Team Member Hallway Feeds of Lexington, Kentucky jumped on board to help produce the special feed.

## Mining for an Answer: Muscle Biopsies Help Researchers Discover Truth About Muscle Disorders

Shave, numb, snip, remove, and stitch. Wait a minute. What just happened? Simply put, a muscle biopsy.

"Horses are generous muscle donors. They don't mind sharing," quipped Stephanie Valberg, D.V.M., Ph.D., an equine researcher based at the University of Minnesota's College of Veterinary Medicine.

For years Valberg has been at the forefront of equine muscle disorder research. She and her coworkers have expanded knowledge of the crippling disease known broadly as tying-up. Specifically, her work has advanced the understanding of two distinct forms of tying up: polysaccharide storage myopathy (PSSM) and recurrent exertional rhabdomyolysis (RER).

Much of her research depends on the microscopic evaluation and biochemical analysis of muscle tissue. In order to test her hypotheses, Valberg must harvest the muscle tissue from horses diagnosed with the disease. Collecting the tissue samples is accomplished through a relatively painless procedure known as muscle biopsy.

"Horses don't have the type of sensors in their muscles that react to the biopsy procedure, so the greatest reaction usually occurs with the needle prick and local anesthetic that is necessary to desensitize the skin," explained Valberg.

President of Kentucky Equine Research (KER) Joe Pagan, Ph.D., concurs. "The horse doesn't feel any pain

from muscle tissue recovery, only pressure. Making an incision in the skin is the only reason anesthetics are necessary."

Horses possess well-developed musculature, but not all muscle tissue is appropriate for diagnosis of muscle disorders. "The middle gluteal is the primary muscle examined in our studies. It's used extensively in locomotion and responds positively to training, which makes it ideal for studying exercise-related disorders," said Valberg. The middle gluteal muscle, which helps the horse propel its weight forward, lies over the croup and gives the rump much of its shape.

"Another option is the hamstring, or the semimembranosus muscle, which runs along the back of the hind leg," continued Valberg.

Interestingly, in human studies, exercise physiologists often sample from the quadriceps, the group of large muscles on the front of the thigh. "This doesn't work on a horse, though, as those muscles are used primarily to unlock the stifle, and they work little during exercise, especially when compared to the middle gluteal," explained Valberg. In the equine model, the quadriceps muscles are found directly above the stifle.

Once a standardised position in the middle gluteal has been identified, a small area, about five square centimetres, is shaved closely. The area is cleaned


"Hallway Feeds is always willing to step up and try new things. They are extremely game, especially when it comes to advancing horse health," recalled Pagan.

To test the effectiveness of Re-Leve, Valberg designed a trial using six two- and three-year-old fillies, all with a predisposition to tying-up. Three diets were used in the trial: a typical sweet feed, the same sweet feed with added bicarbonate, and Re-Leve. The fillies were fed each diet for three weeks and exercised five times a week. Blood samples were taken following each exercise bout to measure the level of creatine kinase (CK). CK is a protein released into the bloodstream by damaged muscle tissue within hours of an attack, and its measurement is useful in determining the severity of the damage. Though all of the fillies repeatedly tied up on the two diets containing traditional sweet feed, none showed any signs of the disease when fed Re-Leve. When sweet feed was consumed, the fillies' CK levels were nearly ten times those when fed Re-Leve. Although Re-Leve is not available in

Australia or New Zealand, KER can assist with alternatives and nutrition advice (1 800 772 198).

Further studies in Valberg's laboratory have reinforced Re-Leve's effectiveness in eradicating signs of tying-up.

The collaboration between KER and Valberg extends beyond the laboratories and to the classrooms of the College of Veterinary Medicine at the University of Minnesota. Third-year veterinary students are given the option to enrol in a series of lectures and labs geared specifically to equine medicine. Over the past five years, several KER nutritionists have travelled to St. Paul to teach students the finer points of horse feeding management. In reciprocation, Valberg has accepted numerous invitations to speak at KER's annual nutrition conference.

Finding answers to complex problems often requires the collective focus of several individuals. With an eye on discovering ways to nutritionally manage disorders like PSSM and RER, KER and Stephanie Valberg are making a difference in the lives of equine athletes. 



thoroughly with an antiseptic such as Betadine, a povidone-iodine solution, and then anesthetised with lidocaine. A one centimetre incision is then made in the skin. A biopsy needle is carefully passed through the opening and into the muscle. The needle is positioned in several areas during collection. Each time the position of the needle changes, a plunger is punched. With each punch, a small section of muscle is excised and tucked away into the needle's storage compartment.

Once it's released from the biopsy needle, a perfectly recovered muscle sample looks much like a five-centimetre earthworm. To minimize any changes in metabolism after they are taken, the samples are dipped quickly into liquid nitrogen. Within seconds the

squishy muscle sample is hardened into a pellet and placed in a storage container. Kept at a temperature of  $-62^{\circ}\text{C}$ , muscle samples can be preserved for years. For microscopic work, the sample is prepared in a special chemical to prevent ice crystals from forming as the tissue freezes in the liquid nitrogen.

Side effects of muscle harvesting are rare. "Needle biopsies are often taken before and after exercise in our work and the horses show no adverse effects. In the small area where the muscle is removed, regeneration is complete within a month," commented Valberg.

Valberg recently visited Kentucky on a training mission of sorts. KER is studying the effects of various antioxidant mixtures on the muscle tissue of performance horses. Blood is usually used as an indirect measure of muscle changes. In this series of trials, however, KER researchers have chosen to test the actual muscle tissue, which may yield more accurate results.

Because muscle biopsy is considered minimally invasive, a veterinarian is always present to help with the procedure. Jaye McCracken, D.V.M., with Hagyard Equine Medical Institute of Lexington, Kentucky, was on hand to learn the biopsy technique from Valberg. Prior to her introduction to KER several years ago, McCracken had little experience helping with equine exercise physiology research. Fine-tuning her muscle biopsy technique is just one added benefit of working with a team of researchers. McCracken will work with KER throughout the duration of this trial.

# GROUND LINE :

## Building a Base for Grand Prix Performance

Located in the heart of wine country, American Canyon is just a stone's throw from Napa, California, USA, but it was not the vineyards that attracted Sanjay Bagai to the area. American Canyon is home to an unassuming stable that houses an impressive roster of international-calibre show jumping horses.



Supplied by Sanjay Bagai

**B**agai drives 85 kilometres from San Francisco seven days a week to work and care for his stable of Grand Prix show jumpers. His dedication is commendable, to say the least, but his work ethic is only the beginning of the commitment he has made to his horses.

In his search for Grand Prix prospects, Bagai travels to Germany four times a year. His discriminating eye will filter hundreds of young horses before he chooses those that he'll ride. And ride he does: it's not unusual for Bagai to try several hundred horses in a single trip. If he is sufficiently interested in a horse after riding it, he will delve into the animal's past. Where was the horse foaled? Was the delivery eventful? Did anything of note occur during its upbringing? Where was the horse trained, and by whom? Who else rode him? What is his nutritional history? Any and all information that can be gathered on the horse is noteworthy to Bagai, and his notes on each animal reveal a detailed developmental history for each equine athlete.

Once a horse has been chosen for inclusion in the stable, it will be cared for and watched more closely than at any point thus far in its life. Not only does Bagai have a weather station that records temperature, atmospheric pressure, and humidity in the stable, but each horse's water system is also monitored closely. Data on weather and water intake are sent to Bagai's home

*One of the promising jumpers in Sanjay Bagai's string of show horses is the Holsteiner gelding Chess, a horse that has excelled in classes held specifically for young jumpers.*

computer and his PDA (personal digital assistant, a wireless handheld computer that provides a calendar and organises personal information), thereby allowing the trainer constant knowledge of his horses' well-being, even when he's not physically present.

Bagai's management style might seem rigid, but the results speak for themselves. He qualified for the 2004 Athens Olympic Games although an unfortunate late-season injury to his 10-year-old Dutch Warmblood, May One, derailed his Olympic aspirations. Undeterred, he fully expects to qualify for the 2008 Olympics to be held in Beijing, China, whether on May One or his latest acquisition, Chess, a massive 17.2-hand Holsteiner he is bringing along.

"I'm very excited about Chess. He has so much athletic potential and the right mind to make it all the way," said Bagai of the seven-year-old gelding.

Qualifying for the Olympics is an expectedly difficult task. A horse and rider combination is eligible only if it can complete a CSI\*\*\*\* Grand Prix competition with no more than four faults before the prestigious show in Aachen, Germany, the largest outdoor show jumping event in the world. Alternatively, horse and rider can make the grade for Olympic contention if they show at Aachen and accumulate four faults or less. Of course, Bagai and his horses must first qualify for these four-star events, a lofty task indeed but one that Bagai is optimistic he can accomplish.

It's not surprising that anyone this meticulous about his horses' care is going to be even more concerned about their nutritional state. Eileen Phethean, the technical support coordinator for Kentucky Equine Research (KER USA), worked with Bagai to refine his horses' diets. "When Mr. Bagai first contacted us with concerns about his current feeding program, it was immediately evident that he had done his homework," remarked Phethean. "He had specific requirements and goals for each of his five warmbloods."

Using Bagai's descriptions and MicroSteed, a software program developed by KER to evaluate equine diets, Phethean found the optimal ration for each horse. She then connected Bagai with a feed manufacturer that produced KER-formulated feeds. KER Team Member Associated Feed of Turlock, California provides Bagai with Equus 3 Performance, a feed that has yielded results beyond Bagai's expectations.

"My horses now have reserves of energy at the end of a training day and at the end of competitions. That's something I didn't have with all of them prior to switching to this nutritional program," said Bagai.

A recent show in Arizona revealed this to be true. "I rode my horses hard every day and never found the bottom," Bagai commented, reflecting on the horses'



associated feed


### Joins KER Roster

Kentucky Equine Research is pleased to introduce Associated Feed as its newest North American Team Member. Located in the fertile San Joaquin Valley, Associated Feed is centrally located and can readily service the entire state of California as well as portions of Oregon and Nevada. Quality service and products have been paramount to this feed manufacturer since its establishment more than 30 years ago. The company's collaboration with KER bolsters its commitment to more than 130 feed dealers and the thousands of horse owners those dealers serve.

The company's feed line, Equus, features seven feeds that are suitable for all classes of horses, at all stages of life and performance. Equus feeds are specially formulated to provide nutritionally balanced meals. Formulations are based on the latest findings in equine nutrition and exercise physiology research. Kentucky Equine Research is proud to have Associated Feed as one of its Team Members.

energy levels. "They were always ready and focused when I asked them."

Bagai walked away from the show with eighteen double-clear rounds and several ribbons, but these accomplishments are not where his satisfaction lies. "I'm just thrilled with the way my horses are conditioned, how quickly and completely they recover after a show, and how focused they are, considering they have energy to spare," he said. He credits the improved nutritional program outlined by KER and Associated Feed with many of these improvements.

KER will continue to follow Bagai and his stable of Grand Prix show jumpers as they head towards the Beijing Olympics. 



Robbi Knudson

# Improving on the Best: Vessels Stallion Farm

There's a simple answer to the question of how to raise better horses: follow a management program that has proven to be successful, and then take each step to the next level. Simple, however, doesn't always mean easy. Considering each aspect of an equine operation—land, breeding stock, personnel, and management—and making each part the best it can be is a daunting prospect. Nevertheless, Vessels Stallion Farm, home of outstanding Thoroughbreds and Quarter Horses, is a model of this plan.

Vessels Stallion Farm sits on a 2000-acre expanse of land about 56 kilometres north of San Diego in southern California. Formerly operated as a cattle ranch, the broad valleys and rolling hills are fertile but dry. When the family bought the property in 1983, Frank "Scoop" Vessels III authorised a system of underground sprinklers to distribute well water over sections of the land, enabling the establishment of green pastures in a region where most horses usually don't have the luxury of grazing fresh grass.

Scattered across the emerald expanse are a large stallion barn with adjacent turnout paddocks, a spacious breeding shed, and a foaling barn with roomy stalls. Other barns provide housing for broodmares or for young horses being weaned, prepped for sales, or trained for racing. Round yards, hot walkers, and exercise yards give way to expansive turnout areas that border a training track where budding

racehorses are given a glimpse of their future. In this area of sparse rainfall, it's hard to gauge the importance of the green fields in this farm's overall success. Do young horses grow better when they can stretch their legs in exuberant gallops over turf-covered hills?

The answer might be hard to prove, but it would be hard to argue against this "back to nature" management plan.

In the highly competitive horse industry, it's tough to get to the top, and almost impossible to stay there for any length of time. Concentrating on one breed would seem like the best way to achieve outstanding results, but Scoop Vessels has achieved enviable records with not one but two racing breeds. The farm boasts stallions, broodmares, and young stock of both Thoroughbred and Quarter Horse blood. The family's interest in the Quarter Horse line was first established with the purchase of Clabber, a stallion acquired in Arizona by Scoop's grandfather, Frank Vessels, Sr. The stallion was bred to a group of mares, some with Thoroughbred bloodlines, bought in Louisiana more than 50 years ago and shipped to California, which at the time was not a hotbed of Quarter Horse racing. The elder Vessels worked to promote racing, successfully lobbying for the legalisation of pari-mutuel wagering and building interest among owners and racing enthusiasts. His son, Frank Vessels, Jr., was next in line to carry along the venture.



Robbi Knudsen

Scoop Vessels continued the family legacy with the purchase of a Quarter Horse colt, First Down Dash. A son of prominent racing sire Dash For Cash, the colt was named Champion Two-Year-Old and Champion Three-Year-Old in his early racing career. Following a victory in the 1987 Champion of Champions Race, First Down Dash achieved the title of World Champion. With track winnings totalling US\$857,000 and 13 victories in 15 starts, the horse retired to begin a breeding career. His first foal crop produced a winner of the All-American Futurity, the richest event for racing Quarter Horses. The young sire proved that success was no fluke when his offspring also claimed victory in the prestigious race the following two years.

After establishing this unprecedented trio of wins, First Down Dash was syndicated and went on to become the leading all-time sire in Quarter Horse racing, producing 29 national champions and three world champions. His record stands as the first and only Quarter Horse stallion whose progeny have reached the US\$50 million mark in total earnings.

Vessels Stallion Farm is carrying on this top bloodline by standing two sons of First Down Dash. Fishers Dash, foaled in 1993, ran the second-fastest 400-meter time of any

two-year-old in the nation and was in the money in five of eight starts. Retired to stud in 1997, his daughters include Hardly Hateful, Champion Two-Year-Old Filly of 2004 and winner of almost US\$437,000 in her first year at the track. Dash to Chivato, a 1996 full brother to Fishers Dash, won the Southern California Derby (grade 1) and the PCQHRA Derby (grade 2) before beginning a career at stud.

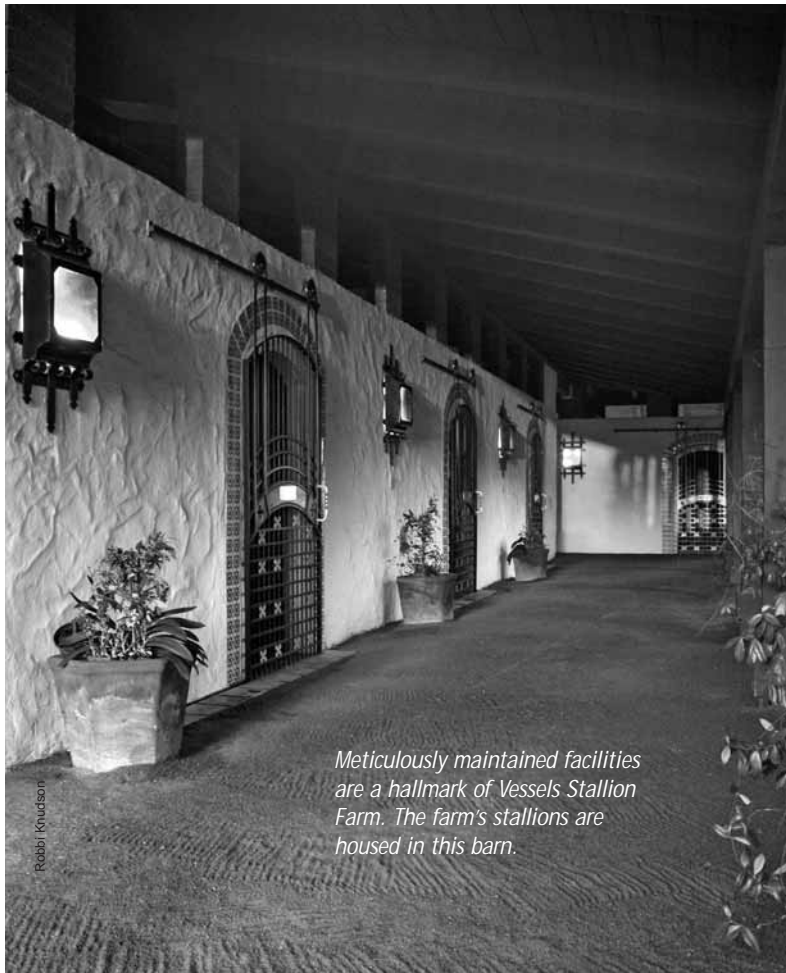
Splash Bac, another Vessels stallion, boasts a record of five wins and three second-place finishes in ten racing starts, credentials that boosted him to the title of Champion Two-Year-Old Colt. He has sired two world champions (Canada), two regional champions, and 137 winners including 25 stakes victors with total earnings of over US\$3.5 million. Buccaneer Beach, stakes winner and Champion Aged Gelding in 2004, is a son of Splash Bac.

In the early 1990s, Vessels Stallion Farm was looking to acquire a promising Thoroughbred stallion. The right horse came along in the form of In Excess, an Irish-born Eclipse Award nominee and winner of close to US\$1.8 million at the track, racing on both dirt and turf. In Excess has had an exemplary stud career, earning the title of leading freshman sire in 1996. He has produced nine California champions and many stakes winners, and his offspring have earned more than US\$22 million to date. Among his

more famous racing sons and daughters are Indian Charlie (1998 California Horse of the Year and Champion Three-Year-Old Colt) and Excessivepleasure (2003 California Champion Three-Year-Old Colt and winner of over a million dollars).

Another of the farm's fine Thoroughbred stallions is Apollo, who is lending his speed to Quarter Horse bloodlines. His daughter One More Habit recently won the grade 1 US\$232,900 Los Alamitos Winter Derby final, and son Old Habits was the 1999 Champion Three-Year-Old Gelding.

As of last year's racing season, Devon Lane, a 1993 son of Storm Cat, had sired 46 Thoroughbred winners for earnings of well over US\$2 million, as well as 12 winners on the Quarter Horse circuit with earnings of more than a quarter-million dollars. Another Vessels stallion is Momentum, a 1998 son of Nureyev, who recently ended a racing career in which he finished in the money in 13 of 17 starts. Momentum will join Apollo and Devon Lane in bringing Northern Dancer blood to the Vessels stallion barn. A last young stallion, Jackpot, is by Seeking the Gold and out of Frolic, a full sister to the successful Claiborne stallion Out of Place. Jackpot raced through his six-year-old season and, like Momentum, is only starting his career at stud. These young horses have been carefully selected to carry the Vessels winning tradition into the future.



*Meticulously maintained facilities are a hallmark of Vessels Stallion Farm. The farm's stallions are housed in this barn.*



*Quarter Horse and Thoroughbred foals are raised at Vessels Stallion Farm.*


According to Rich Decker, Vessels Stallion Farm owns about 120 broodmares, approximately half of which are Thoroughbreds and half are Quarter Horses. Counting mares that are shipped to the farm for breeding, foaling, or other reasons, the resident broodmare count is usually around 400. The farm points all of its young horses toward the yearling sales, Decker said. Vessels animals have brought top dollar at sales in recent years, often leading the day's sale prices.

Decker understands the many details that must be considered in the course of a breeding season. He explained that, in order for a horse to be registered as a Thoroughbred, the mare must conceive from a live cover, so Thoroughbred mares are shipped in for breeding. Quarter Horses, on the other hand, may be produced through artificial insemination or by embryo transfer, so the farm's reproductive centre offers cooled shipped semen by contract. All offspring of First Down Dash, in fact, result from artificial insemination rather than live cover. Embryo transfer, a somewhat more complicated procedure, involves flushing an embryo from a mare's uterus early in the pregnancy and implanting it in the uterus of another mare who then carries the foal to term. The resulting foal is eligible for registration as the offspring of the first mare, although this horse may have long since returned to racing, showing, or another career, or may even have been rebred to produce multiple embryos in the same season.

Decker and the other staff members bring valuable experience to their jobs, and all their skills are needed to keep the large and complex operation running smoothly. Some, including Decker, have college degrees, but all would probably agree that years of hands-on work with the horses is at least as valuable as any classroom learning. "It takes a lot of people, and a tremendous amount of time, to handle the various horses every day," Decker said.

An integral part of horse farm management is the nutritional program that is used. When Decker joined the Vessels team, he asked Dr. Joe Pagan, president of Kentucky Equine Research, Inc. (KER), to evaluate the farm's feeding program and suggest ways to improve it. Pagan, whose training and experience include formulating special feeds for top equine athletes in many disciplines, worked with KER Team Member Associated Feed in Turlock, California to manufacture a custom 14% sweet feed. The feed, which is fortified with KER's proprietary vitamin-mineral-protein balancer pellet, meets the needs of stallions, broodmares, and young horses. Yearlings being prepped for sales are fed a second formulation in which some of the grain is replaced with beet pulp, a fermentable fibre that delivers energy in an extremely safe fashion.

"Other than the pedigrees of the sire and dam, nutrition is one of the most important, but often overlooked, factors in allowing a foal's genetic potential to come through," Decker commented. "We have been very pleased with the service provided by Associated Feed. The professionals at Associated Feed and Kentucky Equine Research have gone out of the way to be sure we have the consultation and products to keep our horses in good condition. I feel they have definitely improved our overall nutrition program." Recent research has pointed out the impact of feeding practices on proper skeletal development, and Decker said the rate of metabolic bone disease has decreased among the young horses at Vessels Stallion Farm since KER's recommendations have been in place.

Producing the best horses may well involve an element of chance, but luck can be helped along by planning, innovation, and attention to detail. Improving the land, acquiring premier breeding stock, building an experienced and capable staff, and following expert nutritional advice have moved Vessels Stallion Farm to its position at the top of the equine industry. 

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# Internship: Countdown to a Career

Graduates of equine studies programs often run into a huge obstacle in their search for employment: little work experience. Prospective employers will usually give the nod only to an applicant with a solid work history. The internship program at Kentucky Equine Research (KER) is designed to fill this gap, providing a springboard to jobs at all levels of the industry.

Internship at KER is offered to university students or recent graduates who want to participate in every aspect of equine nutrition and exercise physiology studies. It's a chance to gain experience, learn skills, and become acquainted with professionals in a wide range of industry positions.

Delia Nash oversees research and development at KER's facility in central Kentucky. She looks for more than impressive academic credentials before selecting each year's candidates. "All applicants should have a strong academic background, but their experience with horses is equally important," she said. "I need individuals who can competently handle different types of horses. They don't need research experience—we're more than happy to teach them the research protocol—but they have to be comfortable with things like grooming, leading, and holding horses for a vet or blacksmith. Solid horse-handling skills are essential."

The perfect intern, in Delia's opinion, is willing to learn new skills and ask for explanation if directions aren't clear. "When conducting research, things have to be done in a certain way so there is confidence in the results," she commented. "Careful attention must be paid to each horse. Things don't always go exactly as planned, but even a small variation or oversight that's not caught can ruin months of work."

Delia explained that there is a tremendous amount of physical labour involved in equine research. "It's not all about standing in a sparkling lab, wearing a white coat," she laughed. "The horses need to be cared for even when they're not involved in a study. The work is rewarding in the long term, but many routine tasks are part of equine research."

Carrie Neads, who has just finished a yearlong internship, agreed. "We would get to the barn about 7:00 every morning," she explained. "We'd check hay, measure and feed grain, groom, and get the horses ready to work on the treadmill. After they had all been exercised, we mucked out stalls, cleaned the barn, scrubbed and refilled water buckets, and checked that we had the supplies we would need for the next few days. Chores were usually finished by late in the afternoon, but someone returned to the barn for an evening feeding and to make a final check of all the horses."

For Pamela Galvin, an intern from Ireland, the work was harder than she expected but would recommend the program to those who want to increase their equine experience. She




*Carrie Neads (left) and Pamela Galvin (above) share horse care and research responsibilities.*

emphasised that her work at KER gave her a new understanding of the importance of forethought, precision, and attention to detail. "A great deal of the job was being alert and keeping up with the little things," she said. "Every day was different. Because we often had multiple studies going with different groups of horses, it was a lot to keep up with, and we had to be sure everyone was communicating so things were done the right way."

The three interns who have just begun their year at KER will have a slightly different schedule. In addition to eight months in the barn, each will spend four months working with Delia Nash as well as KER nutritionist Dr. Larry Lawrence. This phase of the intern program will give participants a feel for the practical applications of equine studies.

KER covers the expenses involved in getting visas for the interns, and also provides a small salary and housing. On days off work, their location in central Kentucky is ideal for interfacing with many aspects of the famed horse community.

The interns have yet another opportunity for continued learning when they attend KER's nutrition conference for international feed manufacturers. Making these contacts has paid off for several former interns who have gone on to advanced studies or industry jobs in the United States, Ireland, England, France, and Australia.

Are you ready to spend a year working, learning, and meeting top names in the industry? If you are, go to [www.ker.com](http://www.ker.com), select the North American site from the "Site Map" options, click on "About KER," and then select "Career Opportunities." 

# Equine Q & A—Questionable Table Manners

My three geldings—a four-year-old, a twelve-year-old, and a twenty-something pensioner—all have great dispositions except when it comes time to eat. The twelve-year-old acts most aggressive when I feed them together in the pasture. They seem to get along fine when feed is not involved. What gives?

Horses are extremely social animals. When grouped in a herd, they arrange themselves in a well-defined social hierarchy, usually based on sex and age. As horses are added or removed from the herd, the pecking order typically shifts. Careful observation of interactions among horses reveals a slew of dominant and submissive behaviours. When it comes to feeding, these behaviors are in full show. In your situation, the middle-aged gelding seems to be the dominant horse.

Luckily, there are ways to keep the peace during feeding time. The most effective method is probably thoughtful arrangement of feeders. Whether they are hung from a fence or placed on the ground, feeders should be set at least 15 metres apart. At this distance, it is impossible for a dominant horse to control more than one feeder. Setting them significantly closer, which is convenient and therefore a common practice, leads to a dominant animal that rushes frantically back and forth in an attempt to claim both feeders.

When feeders are placed too close together, horses may learn to eat hurriedly. Horses that dive aggressively into their feed and swallow large quantities at once are said to "bolt" their feed. These horses might not get the most out of their meals, as sometimes feed is swallowed without being chewed properly. Bolting may also predispose a horse to choke, a potentially dangerous condition in which food becomes lodged in the esophagus.

In a study conducted at the University of Kentucky, researchers measured the time it took for dominant and submissive horses to eat an identical quantity of sweet feed, about one kilogram, out of feed tubs placed in a straight line or arranged in an equilateral triangle. Four groups of three mature horses were videotaped while they ate so behaviour could be monitored closely. Dominant horses completed the meal in an average of 8.04 minutes. Submissive horses, on the contrary, cleaned up their feed in 6.13 minutes, suggesting aggressive horses were considerably more casual about polishing off meals.

The research also indicated that passive horses had more time to eat when feed tubs were placed in an equilateral triangle compared to a straight line. Researchers believe

arrangement in the triangle might optimize visual contact with other horses, more closely resembling the normal grazing behavior of pastured horses.

In a closed herd where animals are rarely added or removed, horses become quite familiar with the routine of feeding. While most remain intensely aware and respectful of the pecking order, out-and-out fighting rarely occurs.

**Q** What is the difference between omega-3 and omega-6 fatty acids?

All fats are comprised of fatty acids that are linked together in long chains by chemical bonds. The number of bonds that join fatty acids to one another determines if a fat is saturated or unsaturated. Saturated fats are solid at room temperature and are derived from animal tissues or dairy products. In contrast, unsaturated fats are liquid at room temperature. Unsaturated fats can be further separated into monounsaturated and polyunsaturated fats, which are obtained from fatty fish and plants.

Polyunsaturated fats are rich in two distinct families of fatty acids: the omega-3 family and the omega-6 family. The omega-3 family stems from alpha-linolenic acid (ALA), and the omega-6 family originates from linoleic acid (LA). ALA and LA are considered "essential fatty acids" because they cannot be manufactured in the body and must be obtained from dietary sources.

Significant members of the omega-3 family are eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Interestingly, the horse's body can convert ALA to EPA and DHA when insufficient quantities of ALA are consumed. The lack of EPA and DHA in equine diets is understandable, as these two fatty acids are found almost exclusively in fish. The fish, namely cold-water species, are at the top of a food chain based largely on algae that manufacture EPA and DHA. ALA, on the other hand, is found predominantly in leafy plants, more traditional components of equine diets than fish by-products (fishmeal or fish oil). Linseed oil is also a rich source of omega-3 fatty acids.

The primary source of omega-6 fatty acids in the diet is LA derived from the oils of seeds and grains. Corn, sunflower, and safflower oil contain abundant quantities of LA. ☺☺

*Do you have a question you'd like answered by one of KER's nutrition advisors? Send your question to Equine Question and Answer, c/o Kentucky Equine Research (Australasia), 112 B Martin St., Brighton VIC 3186, or [equivit@ker.com](mailto:equivit@ker.com), or call 1 800 772 198.*

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