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Equine Editorial Staff

Editor	Robin Stanback
Technical Editor	Mark Llewellyn
Copy Editor	Catherine Bishop
Internet Director	Dennis Christenson
Art Director	Sheri Wood

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Kentucky Equine Research, 3910 Delaney Ferry Road, Versailles, Kentucky
40383, USA. Telephone 859-873-1988. Fax 859-873-1163.

Kentucky Equine Research Staff

President	Joe D. Pagan, Ph.D.
Vice President and Director of Business	Karen Pagan
Vice President of Sales and Marketing	Darrell Ward
KPP General Manager	Mike Warren
Nutritionists	Kathleen Grandell, Ph.D. Larry Lawrence, Ph.D.
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Business Manager	Mary Benedict
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Sales Representative	David Osborne
Special Events Coordinator	Lisa Talip
Technical Clerk	Sheppy Kerr-Jude
Technical Division Coordinator	Eileen Phethean
Visiting Interns	Vicky Abbishaw Melissa Fellows

Kentucky Equine Research Australasia Staff

Kentucky Equine Research Australasia
112B Martin St., Brighton 3186, Victoria, Australia
Telephone 03 9530 6334, Fax 03 9530 6339

Director of Nutrition	Dr. Peter Huntington
Manager Global Logistics	Jeremy Edwards
Nutrition Advisor & Stud Specialist	Graham Jenkinson
Nutrition Advisor & Area Manager VIC, SA & TAS	Megan Luckhurst
Senior Accountant	Ross Graham
Business, Marketing & Equivit Account Manager	Emma Roberts
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Accounts, Export, Administration & Purchasing	Joanne Read

Kentucky Equine Research Congratulates Team Member Champions

BY MARK LLEWELLYN AND ROBIN STANBACK

The proof of the pudding was on the podium at the 2002 World Equestrian Games as Kentucky Equine Research continued its custom of supplying feed to the world's most elite sport horses. Several equine athletes fed Kentucky Equine Research-formulated feeds gave medal-winning performances at the quadrennial event.

Held in mid-September in Jerez, Spain, the World Equestrian Games featured the seven disciplines sanctioned by the Fédération Equestre Internationale (FEI): three-day eventing, show jumping, dressage, endurance, driving, vaulting, and for the first time, reining. The competition brought together over 1000 horses and horsemen from more than 50 countries. Aside from the Olympics, the World Equestrian Games is the most significant equestrian event in the world.

Several global-minded Team Members lent a hand in providing feeds for horses prior to and during the event. Pennfield Feeds contributed immensely to the success of the winning three-day eventing team from the United States. The victory in Jerez represented the first time in nearly 20 years that

Several global-minded Team Members lent a hand in providing feeds for horses prior to and during the event.

an eventing squad from the United States has won a gold medal in Olympic or world championship competition. Members of the triumphant team included David O'Connor on Giltedge, John Williams on Carrick, Kim Vinoski on Winsome Adante, and Amy Tryon on Poggio II. O'Connor, Williams, and Vinoski feed Pennfield products on a daily basis. All of the team horses were given KER-formulated feeds during their training stint in England prior to the World Equestrian Games as well as throughout the competition.

Individual awards were bestowed to eventers based on performances in the team competition. In addition to the four team riders, countries were permitted to enter two other riders in the event. In the individual medal race, five of the top ten finishers were affiliated with Kentucky Equine Research. Williams, Vinoski, and O'Connor racked up fourth-, sixth-, and tenth-place finishes, respectively. In addition to the American contingent, two Australians who regularly feed KER products placed in the top ten. Phillip Dutton, who trains year-round in the United States, placed fifth individually on House Doctor, and Olivia Bunn scored a seventh-place finish on GV Top Of The Line. Dutton, a two-time Olympic gold medalist, has fed Pennfield products for numerous years, and Bunn feeds her mounts a selection of Equivit

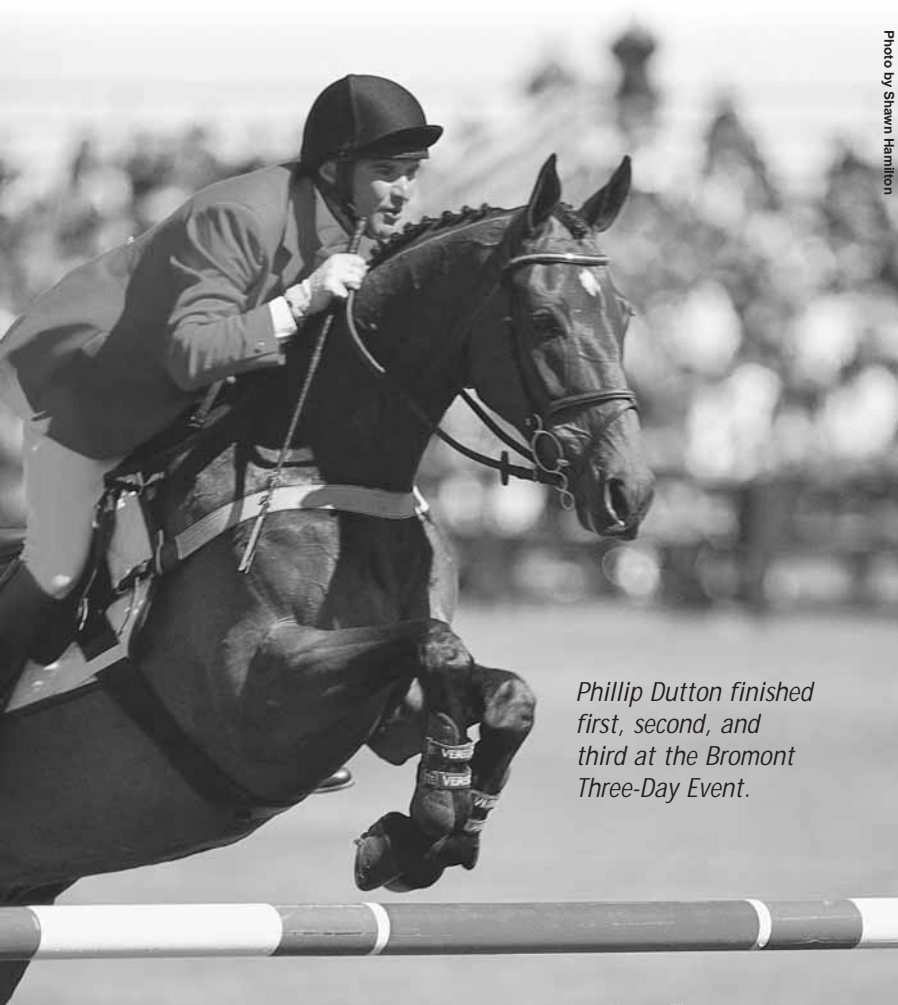


Photo by Shawn Hamilton

Phillip Dutton finished first, second, and third at the Bromont Three-Day Event.

Fuelling Champions Across the Globe



Photos supplied by David Hayes



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Phone (03) 9530 6334 Fax (03) 9530 6339
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for being the feed supplier of
"All Thrills Too," winner of the
Hong Kong International Sprint.

Supplements and Equi-Jewel, a high-fat stabilized rice bran, to boost energy levels.

Pennfield Feeds also supplied feed to Tucker Johnson, the highest-scoring American in the four-in-hand driving competition. Johnson placed fourth in individual competition and was a member of the silver medal-winning team from the United States. This year marks the first time that an American team has earned a medal in a four-in-hand world championship competition.

Bluegrass Horse Feeds of Ireland provided feeds for Dermott Lennon and Liscalgot, the individual gold medal winners in the show jumping competition. Lennon is the first Irish competitor to be crowned world champion, and one of only three Irishmen to ever advance to the final round of competition.

All team horses were given KER-formulated feeds in England prior to the World Equestrian Games...

Brooks Feed Store of Ontario, Canada was also pivotal in supplying feeds for the Canadian three-day eventing squad. Flint River Mills of Bainbridge, Georgia provided feed for Imtiaz Anees, an eventing rider from India who completed the challenging course at Jerez.

Having the feeds on hand at Jerez for so many horses was a complex logistical endeavor for Kentucky Equine Research and its network of Team Members. However, such a tremendous undertaking is hardly alien to Kentucky Equine Research. The company supplied feeds for the horses that competed in the 1996 Olympic Games contested in Atlanta and the 2000 Olympic Games held in Sydney, Australia. In addition to furnishing concentrates, Kentucky Equine Research played a key role in procuring hay for many of the horses competing at the World Equestrian Games. Equine athletes from the United States, Australia, Canada, India, New Zealand, Germany, and Colombia were fed hay selected by Joe Pagan, founder and president of Kentucky Equine Research, and representatives from The Hay Exchange. KER provided its range of nutritional supplements to competitors wishing to use them during the event.

The success of horses fed KER-formulated feeds at the World Equestrian Games underscores the importance of innovative research, cutting-edge feed formulations, and shipping expertise that characterize Kentucky Equine Research.

In this issue of Equine news two giants in the Thoroughbred breeding industry, Arrowfield Stud and Coolmore, are

featured in the article on dual-hemisphere breeding (page 6). Both farms trust KER-formulated feeds and products to provide exceptional nutrition to their priceless charges. Team Member Ridley AgriProducts works closely with other Team Members in the United States, Ireland, and Great Britain to assure that the horses travelling between hemispheres have the best possible nutritional transition.

In Great Britain, KER Team Member Saracen Horse Feeds has become a leader in feeding the country's top endurance horses. Saracen launched a specially formulated feed, Enduro 100, last autumn and sponsored the 165K Lindum Enduro 100. The top two finishers, Yamavar, ridden by Zara Moon, and Gedenski, ridden by Merial Moon, were fueled by Enduro 100. In addition to the win, Yamavar captured the best condition title in that race. Enduro 100 was also the feed of choice for Rebecca Broughton who rode Rawng to a second-place finish in the FEI 65K and for third-place and best condition winner Crusader's Angel ridden by Ann Sanders.

On the racing front, Team Member Farmers Feed Mill, manufacturer of Hallway Feeds, fueled an incredible winning performance by Chip Chip Hooray in the \$1 million Hambletonian, the most prestigious race for Standardbred trotters. Trained by Chuck Sylvester, who has now conditioned four Hambletonian winners, Chip Chip Hooray was fed Race 13.

David Hayes has savoured the thrill of success in big races all over the world, including Australia, Japan and Hong Kong. He has won multiple trainer's championships in Australia and Hong Kong, but the victory of All Thrills Too in the \$2.25 million Hong Kong International Sprint (Group 1) was the highlight of his career in that country. The Lindsay Park "boss" made up for a placing in the race last year with the same horse by decisively winning the rich race over 1000 metres. All Thrills Too's sire, St Covet, was also trained by David Hayes at the Lindsay Park Racing Stable, prior to his move to Hong Kong in 1996.

The Hayes family and Lindsay Park Stud have sought nutritional advice and products from KER since it commenced operating in Australia in 1993. The feed programs are set up so that similar feeds are used at the three stables in Australia and the stable in Hong Kong. This means horses can move between stables without any of the problems that can be caused by a change in feed program. In Hong Kong, horses in the Hayes stable are fed Stablemaster Furlong, a sweet feed for racehorses made by Ridley AgriProducts, and a number of KER Equivit supplements including Restore, Bio-Bloom, Neigh Lox and Hemabuild. The Lindsay Park Racing Stable success is not just confined to Hong Kong. In December, Tony McEvoy trained an Australian record 42 winners which made the Christmas season very festive indeed. ☺☺

Kentucky Equine Research Welcomes Larry Lawrence

BY ROBIN STANBACK

Dr. Larry Lawrence has recently joined the staff of Kentucky Equine Research (KER). The Georgia native did his undergraduate work and received a master's in animal science from his home state university and then studied under Dr. Ed Ott at the University of Florida to attain his doctorate in equine nutrition. His studies focused on mineral metabolism and bone physiology in growing horses.

Dr. Lawrence spent five years as a faculty member at the University of Washington before

has grown rather quickly and has the potential to be a real athlete. There is no hurry. I can certainly wait to see where his talents will lie."

Dr. Lawrence's new position with KER may keep him too busy to enjoy equine sports for a while. He has accepted the responsibilities of leading the KER technical staff and providing support for the company's Team Members throughout the world. He participated as a speaker and coordinator at the most recent KER conference in September and

"Working for KER will allow me to combine my love of research with my interest in educating horse owners."

accepting a position at Virginia Polytechnic Institute (VPI) and State University in 1991. In his position as an associate professor of animal science and the extension horse specialist there, Dr. Lawrence worked with young horsemen on a regular basis. He said, "I think my greatest contribution was the work I did with young people. Extension specialists have the opportunity to share information and educate people. VPI encouraged me to do that and it was a very satisfying experience."

As much as he enjoyed the opportunities available at VPI, the appeal of more research-oriented projects was the lure that brought Dr. Lawrence to KER. He said, "Research was a major focus of my life for a long time. I enjoyed the challenges it presented and I found that I missed that. I was well aware of KER's many projects and the company's focus on sharing the information it uncovers. Working for KER will allow me to combine my love of research with my interest in educating horse owners."

Like many KER employees, Dr. Lawrence brings more to his position than his education and work experience; he is also a dedicated horseman. For many years he was an avid fox hunting enthusiast riding his field hunter, Beau, a draft cross that Dr. Lawrence describes as being "a well-behaved, wonderful animal." Along with this horse, he brought a two-year-old Quarter Horse to Kentucky. "I'm not certain what my Quarter Horse wants to be when he grows up. He

was tapped the following week to provide his organizational skills for the International Conference on Equine Exercise Physiology, which was held for the first time in Kentucky.

KER President Dr. Joe Pagan said, "We are very happy to have Dr. Lawrence on staff and feel that his contributions will be invaluable." ☺



Dr. Lawrence addresses a crowd at KER's recent Equine Nutrition Conference.



Double Duty

Dual-Hemisphere Breeding Makes Stallions the Boys of Perpetual Spring

BY ROBIN STANBACK

While the Thoroughbred industry is frequently seen as one steeped in tradition, the giants of the business have often proven to be innovative. When tradition and innovation meet, the results can lead to advances that can revolutionize an industry. Perhaps the best example of this combination can be seen in breeding sheds around the world.

Many other breeds have sanctioned the use of artificial insemination and embryo transplant, but Thoroughbreds must be conceived by live cover to be registered and raced. For years, the logistics of getting mares to stallions restricted the number of horses that could be bred, but those limitations have been breached by a vanguard of the industry's elite who have used combinations of new ideas and technologies to increase the volume of mares that could visit their stallions.

To everything there is a season, and breeding horses has traditionally been a springtime event. From the early 1900s on to today, veterinary practitioners have worked to understand every aspect of the process and capitalize on the few months when mares' and stallions' biological clocks are at peak performance. Recent advances in veterinary knowledge, including ultrasound examinations, hormonal assays, and new methods of evaluating sperm, allow for more effective methods of monitoring mares and stallions resulting in higher conception rates.

In the early 1980s the breeding soundness standard was developed by the American College of Theriogenologists and was based upon stallions covering an average of 40 mares by live cover and 120 by artificial insemination. This standard, which is still in place today, is outdated according to Dr. John Steiner, with the Lexington, Kentucky veterinary clinic Hagyard-Davidson-McGee and Associates. He stated, "Today's Thoroughbred stallions can cover over 200 mares in one breeding season. Common thinking years ago was that a stallion's fertility would decrease if he were bred too many times. Research has shown that not to be the case. Interestingly, we have found that, as the number of mares booked to a stallion increases, so does the rate of pregnancies per cycle. The stallions that get these larger books are typically the more valuable stallions. The mares bred to these horses tend to come from places where mare management is more intense.

The result of this increased level of care is that more mares get in foal on one breeding."

The increase in breeding shed efficiency led to larger bookings for stallions. Calumet Farm was one of the first in the United States to capitalize on this with the prepotent Alydar. In 1988 Alydar covered 97 mares. While the number of mares was exceptional at that time, so too were the dates on which he covered them. That year Alydar bred his last mare on November 6. She was one of a number of mares shipped from South America to be bred to the horse and then returned home to deliver.

Alydar was far from the only horse covering mares from the Southern Hemisphere. Other stallions both in the United States and Europe were also being introduced to mares from south of the equator. As it became obvious that the larger number of bookings was not compromising the health of the stallions, some owners and farm managers began to explore

Flying Spur on his way to the paddock.



Photo supplied by News Limited

the idea of sending the stallions to the mares.

The concept of dual-hemisphere breeding took off when the great stallion Danehill was shipped from Ireland to Australia in 1990. Up until this year, when he was given a break from his string of 24 consecutive breeding seasons, the horse was a veritable frequent flier as he shuttled between the two countries. He led the Australian sire list five times and his progeny have amassed wins in 187 stakes races at this printing. Peter O'Brien, the manager of Coolmore in Australia, praised the horse's willing disposition, saying, "Danehill is an amazing horse. A baby could handle him, and he never so much as had a temperature. He is really the archetype shuttle stallion."

Temperament is certainly a factor in deciding which stallions make good candidates for shuttling, but it is only one small piece of the decision-making process. Bloodlines are a larger factor. John Messara, the founder of Arrowfield Stud, explained, "Obviously we look for a horse that we believe will suit our local racing program but also one that will have commercial appeal to breeders. This is an issue of judgement and then marketing. It is always preferable to target a stallion whose progeny have done well in conditions that approach those in Australia. An example of this would be Zafonic. He was a sprinter/miler which is ideal for Australia. He was also an excellent two-year-old himself, and is a progenitor of good two-year-olds. The Mr. Prospector sireline is known and appreciated here and has crossed well with Sir Ivor- and Northern Dancer-line mares which are prolific in Australia."

"Danehill is an amazing horse. A baby could handle him, and he never so much as had a temperature..."

Arrowfield is known for shuttling outstanding stallions. Among them are Fuji Kiseki (by Sunday Silence and out of Millracer) who spends the first half of the year in Japan, and Danzero (by Danehill and out of Confidentially) who flies from Australia to Great Britain. Both carry the type of bloodlines certain to attract the interest of sales-oriented breeders as well as those who breed to race. Together with the farm's resident stallions, these horses provide a variety of popular bloodlines.

Coolmore also maintains a varied and popular stallion roster that sees, among others, Kentucky Derby winners Fusaichi Pegasus (by Mr. Prospector and out of Angel Fever) and Thunder Gulch (by Gulch and out of Line of Thunder), as well as the horse scheduled to replace Danehill in its Australian breeding shed, Giant's Causeway (by Storm Cat

and out of Mariah's Storm.) Known as the "Iron Horse" for his ability to race a rigorous schedule and remain sound, Giant's Causeway has generated a tremendous amount of excitement because of his race record (winning six Group 1 races throughout Europe), and the fact that his offspring are proving to be hale and sturdy.

Once the stallions have been chosen for dual-hemisphere duty, transporting them is a job delegated by both farms to International Racehorse Transport. (See article on air transport, page 10.) The company's experienced staff works with the farms and their crews to assure the horses' safe arrival at their new homes. Flying the horses from place to place has become considerably easier than it was in the 1980s when Mr. O'Brien made his first trip to Australia. He said, "It was like flying in Noah's Ark. There were all sorts of animals—zoo animals mostly—and then my horses. You don't see that anymore. Actually, most of the stallions made the trip very well even then. They are good travelers. Most of the really popular horses have been racehorses, so they have traveled quite a bit and are accustomed to it."

Both Coolmore's Mr. O'Brien and Arrowfield's Australian farm veterinarian, Dr. Mark Wylie, agree that providing exceptional and consistent care for these very valuable animals is essential to their well-being and their ability to perform their jobs. The experience the farms have had has led to the development of programs that have assured their success and allowed them to avoid some of the quarantine problems experienced by some smaller operations. Every country has different quarantine restrictions that require horses to be isolated for specific lengths of time. Coolmore and Arrowfield have their own licensed quarantine stables so that the horses can be kept in familiar surroundings for the duration of the quarantine period.

Dr. Wylie stated, "Every horse is an individual and must be treated as such. We liaise closely with the Northern Hemisphere farms to determine each horse's particular needs and even their personality quirks. Horses are definitely creatures of habit; they need continuity. We want to be able to limit the amount of change these animals have to experience. Another way we have found to do this is to have each horse travel with the groom that has been caring for him. We have found this to be most important."

Mr. O'Brien concurred, adding, "Our horses always travel with their regular grooms, and these people continue working with the horse for the duration of the stallion's stay in Australia whenever possible. They know the horses best and can tell immediately if something isn't just right."

Another aspect of the horse's care, the nutrition program, is carefully monitored by all the stallion managers. The availability and types of feeds and hays differ between hemispheres, and the farms must rely upon carefully formulated programs to protect their charges. Dr. Wylie said, "We work to keep the stallions on

feeds that are as similar as possible to lessen the changes of gastric upsets.”

Here again, the quirks of the individual horse play an important role. Mr. O'Brien laughed, "Danehill could look at an oat and gain a pound. Still, it was important to devise a program that would assure that all of his nutritional needs were being met. Other horses might need far more feed to maintain their weight, but there again, the balance must be made.”

Exercise and light are also vital in helping the horses adjust to a different season than that which their bodies were expecting. In keeping with the goal to maintain the horses' routines, both farms have designed exercise programs for each individual. Mr. O'Brien said, "What we have found is that our horses, particularly the Irish ones, do well with exercise. It helps to keep them healthy and to give them a mental break. Really, these horses seem to thrive in Australia, and they do enjoy having the sun on their backs.”

Sunlight and artificial lights are used to help the horses adjust to the change in hemispheres. Dr. Wylie explained, "Naturally, a horse would not experience two springs in one year. We use light to help the horses make the adjustment, and have found that the horses do well with between 16 and 18 hours of sunlight. We box (stable) our stallions every evening. This allows us to supplement the sunlight with artificial light.”

The problems that equine experts thought would arise from "overworking" stallions have not surfaced. When Alydar's book grew to twice the accepted levels in the mid-1980s, some horsemen expressed the concern that the animal would lose interest in his job and quit performing. Dr. Steiner, along with Dr. W.R. "Twink" Allen, head of the Equine Fertility Unit In Newmarket, England, studied shuttle stallions for two years, collecting semen and blood to measure hormone levels. They discovered that the natural bell curve that is seen in most stallions' hormonal assays during a breeding season was duplicated for the horses that traveled across the equator. Fertility was not affected. "Indeed," explained Dr. Steiner, "we found the only limiting factor for the horses to be libido.”

Dr. Wylie has found the same to be true. He stated, "Most shuttle stallions experience a slight decrease in fertility in mid-October for about eight to ten days. This flat spot seems especially marked in stallions that have been shuttled for three or four years consecutively. We try to give them a bit of break and then they come right back. It has not been a problem for us.”

Indeed, if there were fertility or libido problems the numbers of horses bred would reflect them. Some of the superstar stallions of the recent past have settled impressive numbers of mares quite successfully. Thunder Gulch bred a total of 371 mares in 2001, 216 in the United States and 155 in Australia. Fuji Kiseki bred 225 mares in



Danehill, cast in bronze, at Coolmore's Southern Hemisphere location.

Japan and 83 in Australia for a total of 308.

Considering the volume of mares bred, the financial aspect of transporting these stallions is considerable. Dual-hemisphere breeding can double the income produced by one of these valuable animals whose stallion service fees often run in five—and occasionally six—digit figures.

While the business of breeding horses is a multimillion dollar endeavor, the people who own, operate, and care for these animals are first and foremost horsemen. Neither Mr. O'Brien nor Dr. Wylie would initially admit having a favorite, but each eventually talked glowingly about at least one.

"As a professional, I appreciate each individual and it would be difficult to choose any one over another," Dr. Wylie began, "but I do rather like Fuji Kiseki. He's just a lovely animal. He has a unique personality. Oh, they all do.”

Mr. O'Brien laughed when asked about any favorites he might have among his charges. "They are all special. But, I'd have to say I'm awfully impressed by Fusiachi Pegasus. He handled the shuttling last year with aplomb, and his first foals are the best I have ever seen.”

The experience and knowledge gained by the farms from years of shuttling stallions have been shared with the entire Thoroughbred industry. From this has come better transportation conditions, an expanded knowledge of equine reproduction, and a broader base of equine bloodlines for breeders to access. Dual-hemisphere breeding may well be a prime example of industry growth at its best. ☺☺

n the Wings of Progress:

Advances Transform Equine Air Travel

BY ROBIN STANBACK

Recent medical and technological advances have revolutionized equine air transport from an occasionally dangerous and often lengthy process into a modern-day magic carpet ride. This transformation has had a profound impact on many facets of the horse world, but perhaps none so much as that on the Thoroughbred industry, which has seen an increase in truly international competitions as well as the movement of valuable breeding animals from one hemisphere to another.

Larger airplanes capable of flying longer distances in less time, safer traveling compartments, and more effective tranquilizers have all played a part in the metamorphosis of a relatively young industry. The information gleaned from recent research on traveling conditions for horses has also led to changes that have provided safer handling methods to help horses arrive at their destinations in a healthier condition.

Quentin Wallace, the founder and chairman of International Racehorse Transport (IRT), pioneered the practice of flying horses into Australia in the early 1970s. His business has grown exponentially to the point that, today, IRT is known for its ability to regularly move horses around the globe. The company was tapped by the Sydney Olympic Organizing Committee to coordinate the transportation of all the equine athletes to the Summer Games in 2000. This job represented the largest peacetime movement of horses into and out of Australia. IRT has been a boon to

breeding operations around the world and anticipates moving over 80 stallions to Australia and New Zealand this year for the Southern Hemisphere breeding season.

Mr. Wallace has definitely seen the impact the changes and innovations have had upon his business. He explained, "When IRT first began shipping horses, owners would have to wait for a full load to be able to ship their animals. Today, we have regularly scheduled flights that can hold up to 87 horses in one plane. Also, the earlier flights took considerably longer than they do today. The planes were smaller and had to stop for refueling. In the past, horses could be on the plane for 50 hours or longer. Today,

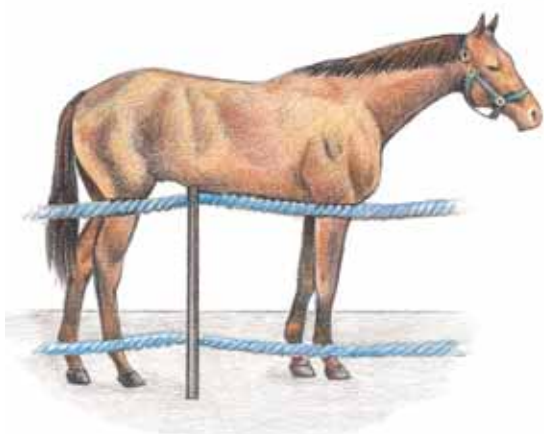


Padded containers that can hold up to three horses in individual stalls are first loaded, and then carefully lifted onto the plane. Once inside, they are rolled into place and secured for the duration of the flight.



Photos supplied by IRT

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Boeing 747 planes cut travel time. It is possible for a horse being transported from Europe to Australia to spend no more than 36 hours in total travel time from stable to stable. This in itself is considerably better for the animals.”

While some companies still have planes that utilize ramps and portable stalls, most have made use of container compartments to safeguard the horses during the flight and to make loading and unloading the plane significantly easier. The containers are made of three padded stalls with 28-inch stall fronts. Horses can be cross-tied, but Mr. Wallace stated, “Most of the time the horses are tied on one side so that they can move a little bit easier to get to their hay nets. It is also possible for their handlers to drop a bar on the stall front that allows the horses to put their heads down from time to time. Research has shown that if

One way IRT protects its passengers is to have every horse travel with experienced handlers and veterinarians.

horses can do this they can clear out their sinuses better and perhaps lessen the chance of developing an upper respiratory problem.”

Safety issues have become an even greater concern for every airborne passenger since the tragedy of September 11, 2001, and horses are no exception. At one time insurance policies that covered the life and usefulness of an animal automatically applied to horses in transit. Many policies now have an extra charge for horses that are flown to their destinations. Mr. Wallace feels that liability concerns have also added to the expense of insuring an equine passenger.

One way IRT protects its passengers is to have every horse travel with experienced handlers and veterinarians. One recent flight transported a trio of Kentucky Derby winners—Thunder Gulch, Real Quiet, and Fusaichi Pegasus—from their homes in the United States to breeding shed duties in Australia. As might be expected with such precious cargo, extra precautions were taken. Among them were veterinarians Des Leadon of Ireland, one of the world’s leading researchers on equine travel stress, and Fairfield Bain, a partner in the Lexington, Kentucky-based veterinary firm Hagyard-Davidson-McGee. Mr. Wallace explained, “Most of the breeding operations that transport horses from the Northern to the Southern Hemisphere have a good idea of which horses will have the right temperament to make the trip and to do the job

required of them. Danehill, one of the most successful dual-hemisphere breeding stallions, is a good example. That horse made the shuttle trip every year from 1990 until this year, when he was given a break from the schedule, and has always been an exemplary passenger. He is very, very quiet. Still, we work diligently to be prepared to meet any problems the horses might have. As a result, IRT has never failed to deliver or return a horse that has been placed in its care.”

Mr. Wallace said that the vast majority of horses he has transported have not needed chemical persuasion to travel quietly, but “sometimes a horse will become upset. For these horses, the proper tranquilizer given at the appropriate time can make all the difference.” Dr. Bain agreed, saying, “We occasionally need to sedate stallions with Dormosedan (detomidine), usually only when they get anxious during the long loading process. Once airborne, they rarely have much of a problem. The highest risk for injury is on landing where they may get caught off balance, but injuries have fortunately been minor and rare.”

Human and equine passengers share a common problem on long flights. Dr. Bain explained, “Horses have hay nets and are watered as frequently as possible to avoid severe dehydration. Minor dehydration occurs as it does in human passengers (you may have experienced the flight attendants filling your water glass often on long trips) but does not seem to cause any clinical problem. In general, most of these stallions are seasoned travelers and make the trip better than the humans do.”

Peter O’Brien, the farm manager for Coolmore Australia, is responsible for the health and welfare of some of the world’s most valuable equine frequent fliers such as Danehill, Fusaichi Pegasus, and Giant’s Causeway when they are in residence at the farm in Australia. Mr. O’Brien agreed that a good temperament is essential for a stallion to be a successful candidate for their breeding program, but he added, “The key to the success we have had with our dual-hemisphere stallions is IRT. Its expertise, attention to detail, and excellent staff allows us to move our horses with confidence.”

The lion’s share of attention seems to fall upon the stallions that shuttle between hemispheres, but they are not the only horses that make the journey. Often it is the mares that visit the stallion’s home breeding shed. Mr. Wallace indicated that the mares are handled in much the same fashion as their male counterparts. He said, “The main goal is to keep the horses safe and to get them to their destinations as quickly as possible.” Today’s larger and faster airplanes, experienced ground and flight crews, and the careful attention to detail paid by everyone associated with the horses have opened the doors to global opportunities for horsemen. ☺☺

Principles of Sound Growth

BY LARRY LAWRENCE, PHD AND PETER HUNTINGTON, BVSC

Few animals are as precocious as the horse. Within 20 minutes of birth a foal may stand, and within hours can be ready to run at speeds no human athlete will ever achieve. At this early stage of life, even with this exceptionally early development, horses have only 17% of their mature bone mineral content, but they also have only 10% of their ultimate body weight. The relationships between growth, nutrition, bone strength and development, body weight, and the forces applied to bone are all orchestrated in a careful balance when optimal growth is achieved.

The selection and breeding of horses for desirable traits have been practised for over 2000 years. However, most of what we have learned about the growth of horses has been recorded in the past 20-30 years. In 1979 Dr. Harold Hintz reported Windfields Farm's growth data for 1,992 foals from birth to 22 months of age. The records illustrate how quickly foals grow. Thoroughbreds and other light horse breeds will reach 84% of their mature height at six months of age. Assuming a mature Thoroughbred will be 16 hands, the six-month-old weanling will be approximately 13.2 hands. At 12 months that horse will have reached 94% of its adult height or around 15 hands, and at 22 months it has almost finished growing in height, reaching 97% of its full height at approximately 15.2 hands. Mature weight is reached at a slower rate; during the first six months of life the foal will gain 46% of its mature weight. Assuming a mature weight of 500 kg, the six-month-old will weigh approximately 230 kg. At 12 months it will have reached 65% of its mature weight (325 kg), and at 22 months it should be 90% of its adult weight (450 kg). Average daily gains described by Hintz are the same as those recommended by the National Research Council (NRC) for moderate growth (Table 1). The NRC reports that six-month-old weanlings with a projected adult weight of 500 kg gained 0.65 kg per day. Twelve-month-old yearlings gained 0.5 kg per day, and 18-month-old long yearlings gained 0.35 kg per day.

Radiographic studies on the acquisition of bone mineral in horses from one day of age to 27 years have shown that maximum bone mineral content (BMC) is not achieved until the horse is six years old. If the rate of mineralization of the cannon bone and age are compared, a pattern emerges that is more similar to that of weight gain than height. At six months of age horses have attained 68.5% of the mineral content of an adult horse, and by one year of age they have reached 76% of maximal BMC. Bone is a much more dynamic tissue than it appears to be upon casual observation; However, complete bone mineralization lags behind growth in height and weight.



Photos by Mark Llewellyn

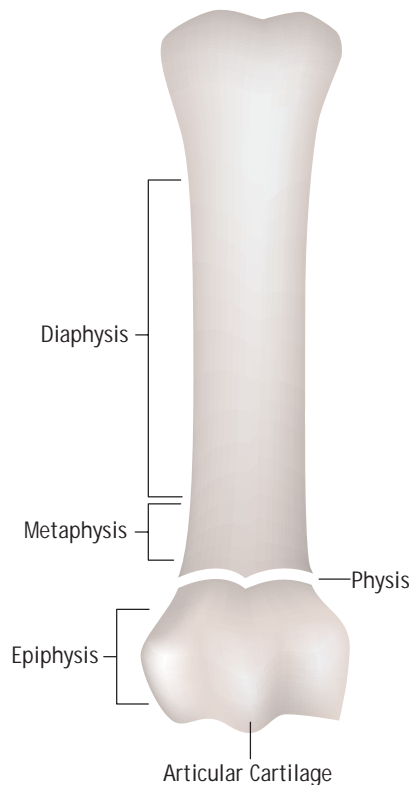
Projected Growth Parameters for a Young Horse

Age	Height	% Mature Height*	Weight	% Mature Weight*
6 months	13.2 h	84%	230 kg	46%
12 months	15.0 h	94%	325 kg	65%
22 months	15.2 h	97%	450 kg	90%

*Estimates based on 16-hand, 500-kg mature horse.

Height or long bone growth is the developmental priority for young horses. Energy, protein, minerals, and vitamins are first directed to maintenance requirements, and any additional nutrients are used for skeletal growth, specifically long bones (limbs for locomotion) and flat bones (skull, ribs, etc. for protection). Additional nutrients above those needed for optimal bone development are used to fuel more rapid growth, first developing muscle and then producing a heavier and more well-developed young horse. Optimal growth rates may vary somewhat between breeds, but all young horses have several critical considerations for bone growth and development. Extremely rapid growth caused by overfeeding (particularly energy) has been implicated in developmental orthopaedic disorders (DOD) and unsoundness. Periods of slow or decreased growth followed by rapid growth are particularly dangerous. Imbalanced levels of calcium, phosphorus and trace minerals have been linked to DOD. Forced exercise or prolonged confinement in a stable also seems to cause bone development problems.

Optimal bone development is greatly influenced by nutrition. During the first two months of life, the mare's milk contains enough energy, protein and other essential nutrients to meet the needs for growth. Work in Australia



has shown that a horse maturing to 500 kg requires approximately 9 kg of milk for each kg of gain at seven days of age, 13 kg at one month of age, and 15 kg at two-months-of-age. Thoroughbred foals may consume up to 20 kg of milk per day. The six-month-old foal requires around 15 kg of milk per kg of gain, so they should be gaining just over one kg per day. Beyond two months of age, there is a decrease in milk production and additional nutrients must be supplied by pasture or feed until weaning.

Bone development begins before birth and continues beyond 18 months of age. The period between three and nine months of age appears to be the most precarious for the foal in terms of DOD. During this time serious conditions can develop that might restrict the athletic potential of a horse. It is important to monitor growth rates and evaluate the foal's skeletal development. (See sidebar titled Developmental Orthopaedic Disorders in Growing Horses.)

Steady, moderate growth along a typical growth curve appears to provide the best method of reducing developmental problems. Kentucky Equine Research has been weighing and measuring foals, weanlings, and yearlings monthly in central Kentucky for over 10 years. Those records, combined with numbers from universities and Windfields Farm in Canada, have resulted in a tremendous vault of comparative growth data. This data has been formulated into Gro-Trac, software designed to track growth and make comparisons with databases containing thousands of foals. In addition, the program creates an organised system for recording issues that a particular foal might be experiencing, and also saves digital images of the foal as a reference tool.

Foals begin to nibble grass soon after birth, but they do not develop a functional hindgut that will allow them to extract significant nutrients from forages for months. In contrast, their efficiency of grain utilisation is high at three weeks of age.

Researchers in Australia, New Zealand, and the United States have recently focused on the contribution of pastures to the nutrition of growing horses. Variability in pastures is considerable across regions and seasons of the year. When pastures were analysed across seasons, researchers at Virginia Tech found that the amount of hydrolysable and rapidly fermentable carbohydrates could be as much as five times higher during the spring and autumn as opposed to winter and summer for cool season forages. While many professional horsemen

Managing Growth

The Rural Industries Research and Development Corporation of Australia recently published a list of suggestions for minimising the risk of DOD in young growing horses.

1. Promote a moderate, steady growth rate.
2. Diets should contain adequate, but never excess, energy.
3. Calcium and phosphorus ratios should be maintained between 3:1 and 1:1.
4. Maintain adequate intakes of minerals, including calcium, phosphorus, copper, zinc, manganese, magnesium, selenium, etc.
5. Provide an opportunity for sufficient exercise.
6. Avoid breeding mares and stallions that have produced a number of foals with DOD.

New Program Provides Road Map for Tracking Growth

BY MARK LLEWELLYN

A conscientious breeder has done everything in his power to produce healthy young horses. He has enlisted the services of a top-notch nutritionist to evaluate his feeding program and a team of veterinarians to ensure the horses are maintained on an aggressive vaccination and deworming schedule. Every management decision is made to encourage sound growth. But can he determine how the growth of his young horses stacks up against that of other weanlings and yearlings? Sure, he can eyeball other breeders' horses, but in an industry that is depending more on technology and less on old-school methodologies, there is now a tool available to help secure slow, steady growth—an integral factor in reducing skeletal problems in young horses.

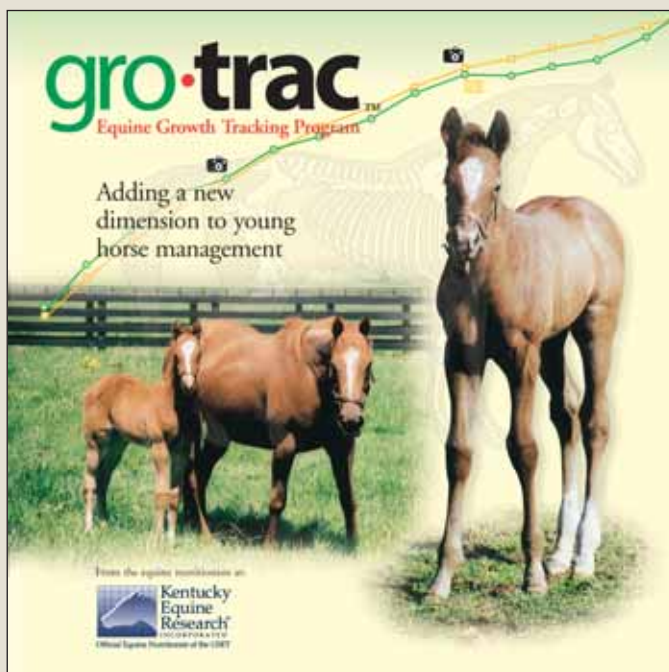
Gro-Trac is an equine growth tracking program that allows breeders to contrast the growth rates of their stock with those of other young horses. Joe Pagan, president of Kentucky Equine Research, laid the foundation for Gro-Trac more than a decade ago when he and Steve Caddel of Farmers Feed Mill began measuring young horses throughout central Kentucky. The information Pagan and Caddel amassed over the years was compiled into a vast database and represents the core of the software.

The database is arranged in reference groups and includes the weights, heights, and average daily gains of thousands of foals, weanlings, and yearlings. By using Gro-Trac, horsemen can compare the growth of their young horses with the growth patterns of thousands of horses in a particular reference group. Suppose, for example, a Thoroughbred breeder would like to know how his weanling fillies born in January are faring in comparison to other weanlings of similar age. He would select the reference group labeled "Fillies, Thoroughbreds, Born in January, Located in KY."

Within seconds of inputting height and weight data, these statistics are displayed graphically for prompt visual assessment of growth. Line graphs show the growth curve for the young horse as well as the reference group of choice, and bar charts depict average daily gain comparisons. Once growth curves are studied, an appropriate management decision can be made regarding the way the youngster will be fed in the future. For instance, if a precocious individual is growing

by leaps and bounds when compared to its peers in the reference group, the breeder may choose to slow growth by decreasing the amount of energy in the diet.

In addition to growth data, photographs can be imported into the program to show physical changes that occur between weighings. Management notes can also be added at any time. Such comments may be necessary to explain a slowdown in growth such as following weaning or during an illness. Symbols signifying the presence of a photograph or comment will appear on the graphs. These features create an ongoing history of each foal. Easy-to-read, customized reports can then be printed from the program.



Farm managers agree that Gro-Trac is an objective management instrument. "We can spot red-flag babies quickly. It is easy to miss subtle changes when you see these young horses every day, but Gro-Trac catches them. In other cases, the program validates thoughts we have had about a horse. We can use this information if something should happen down the road," said Nick Lotz, owner and manager of Briarbrooke Farm, a Thoroughbred nursery in Paris, Kentucky.

Gro-Trac has proven to be an irreplaceable tool for commercial boarding operations with out-of-town clients. About three-quarters of Lotz's clients, for instance, do not regularly visit the farm. Gro-Trac allows Lotz to send these

clients detailed accounts of their horses that may include growth curves, photographs, and even pertinent comments from the individuals who handle the horses daily.

The program is equally useful to the caretakers of horses on privately owned farms. The crop of yearlings residing at Henryk de Kwiatkowski's Calumet Farm are the first horses on the farm to be followed by Gro-Trac from birth. Tony Cissell, the general manager of Calumet Farm, uses Gro-Trac to assess growth and to head off problems. "Having this program is like having Doppler radar. I haven't had any storms yet, but I'm ready to catch them quickly if something should happen."

No other management tool monitors growth as completely as Gro-Trac. The creation of Gro-Trac represents the melding of old-fashioned horse sense and modern technology, and use of this software fine-tunes the management of young horses as never before. ■

Developmental Orthopedic Disorders in Growing Horses

BY LARRY LAWRENCE, PH.D.
AND EILEEN PHETHEAN



Developmental orthopedic disease refers to several growth abnormalities that affect young horses. The most prevalent forms of developmental orthopedic disease are defined here:

- Osteochondritis dissecans (OCD) results when a cartilage flap or a free-floating piece of cartilage invades a joint. Common sites for OCD lesions are the stifle and hock.
- Subchondral cysts are osteochondrotic lesions that result from the infolding of thickened joint cartilage. Subchondral bone cysts appear in areas of high compression and occur most frequently in the femur and less usually in the forearm, gaskin, knee, hock, and cannon bones.
- Cervical vertebral malformation (wobbler syndrome) is thought to be caused by osteochondrosis and includes malarticulations and degenerative changes of intervertebral joints. Developmental changes can lead to narrowing of the vertebral column and compression of the spinal cord.
- Physitis occurs when osteochondrotic lesions in growth plates lead to enlargement of the epiphysis above the knee, hock, and fetlock. The affected bones would therefore be the forearm, gaskin, and cannon bone, respectively.
- Angular limb deformities are deviations in limb alignment in relation to the midline of the limb. The deformities are considered valgus (rotation away from the midline) or varus (deviation toward the midline). Valgus deformities of the carpus are the most prevalent angular limb deformity among young horses.
- Cuboidal bone malformation results from the collapse or injury of carpal and tarsal bones, and can occur in premature foals that have delayed ossification. Cuboidal bone malformation typically leads to severe angular deformities.
- Acquired forelimb contracture is the result of joint pain caused by physitis, OCD, septic wounds, or hoof infections. Any pain within the limb can initiate flexion-withdrawal reflex, which culminates in flexor muscle contraction and an altered position of the joint.

recognize the importance of pastures to growth and development, pasture care is not often given the attention it requires.

Pastures basically fall into the categories of cool season or warm season, and grass or legume. What species are found in a particular area is dependent on the annual rainfall and seasonal variations in temperature. For example, a common pasture for a temperate climate might include ryegrass, phalaris, fescue and clover. Pastures subjected to adequate fertilisation and rainfall during early spring and fall may produce forage that can support gains in weanlings of up to one kg per day, although vitamin and mineral supplementation would be necessary. Studies at Virginia Tech have confirmed that even under the best conditions pasture will fall short of some key mineral and vitamin requirements, and may vary depending on the location of the farm. However, these same pastures during typically hot and dry summer weather will not provide enough nutrients to support maintenance needs. To avoid the deleterious effects of these drastic swings in available nutrients, producers supply nutrition through carefully fortified rations.

Pasture is one variable of feeding young horses that is constantly changing, and must be accounted for to control growth. Changes in weather patterns, for

example, may cause a flush of pasture growth and subsequent weight gain, or a drought may leave pastures barren and unable to fulfill nutritional requirements for growth. The effects of undernutrition followed by overnutrition were illustrated by researchers

While many professional horsemen recognise the importance of pastures to growth and development, pasture care is not given the attention it deserves.

at Cornell University. Dr. Hintz fed one group of Standardbred weanlings free-choice feed for eight months, and a second group was given restricted feed for four months and then free-choice feed for four months.

Two-thirds of the foals in the restricted-feed group developed contracted tendons within one to four months of being switched to free-access feed.

Several studies of young horses on pasture demonstrate the effects of undernutrition followed by overnutrition. In one project, six-month-old Danish warmblood colts were fed to gain either 0.8 or 0.44 kg per day until they were 12 months old. Then, all foals were put in the same pasture to graze. During the first six months of grazing, the colts fed for slow growth rebounded by gaining 140 kg and colts fed for fast growth gained an average of only 75 kg. This divergence in growth rates describes the compensatory growth expected to increase the incidence of DOD. The authors also noted that the horses fed for higher gains were significantly heavier and taller with greater cannon bone circumference, even after compensatory growth. The researchers continued the project for two more years. While all the horses were essentially the same height as three-year-olds, the horses fed for more consistent and steady gains were reported to be more vigorous and aggressive.

In a study at the University of Queensland Veterinary Science School, 15 Australian Stock Horse weanlings were divided into three groups. One group was fed a nutritionally complete pellet diet, a second group was rotationally grazed through three paddocks every three weeks, and the third group grazed the same paddock throughout the 60-week study. The mean body weight gains of the completely hand-fed group, the rotationally grazed group, and the group that remained on the same pasture were 0.5, 0.37 and 0.33 kg per day, respectively. At the end of the experiment, the horses in the hand-fed group were significantly heavier and had higher body condition scores (system of evaluating the level of fatness of horses) than the horses in the other two groups. The authors indicate height and muscle mass were similar; however, the hand-fed group had more compact (harder or denser) bone between six and 12 months of age. The chemical analysis of the pastures revealed that some had mean crude protein concentrations below those recommended for growing horses, and a high proportion of the pastures were deficient in calcium, copper, and zinc. The pastures with low calcium concentrations also had inverted calcium-to-phosphorus ratios (below 1:1). Diets containing an inverted calcium-to-phosphorus ratio and low zinc and copper concentrations are associated with the development of DOD.

Exercise and Bone Remodeling and Development

While these studies illustrate that there are potential problems with pastures, with careful management the advantages of exercise greatly outweigh the

disadvantages. Bone responds to exercise. For example, bone will not grow and remodel when subjected to a certain level of inactivity. C.A. Porr and co-workers in Virginia placed 12 conditioned Arabians in stalls for 12 weeks. During the study, they were placed on a mechanical walker for two 30-minute exercise sessions per day and then returned to their stalls. Bone mineral content decreased 0.45% per week over the 12-week study. The authors stated that confinement may weaken bones, increasing the risk of skeletal injuries when training or free exercise is resumed. At the opposite end of the spectrum, researchers at Texas A&M and Michigan State University have repeatedly shown that standard training practices result in a bone remodeling process that, if not monitored, can result in the weakening of bone and the development of bucked shins over a period of 60 days in long yearlings and two-year-olds. Anecdotal evidence suggests young halter horses fed for rapid growth and overexercised may also develop skeletal injuries.

Controlling Growth by Pasture Supplementation

Concentrate or grain supplementation should be designed to provide nutrients that are not found in adequate amounts in the forage. Several of the key nutrients of concern have already been mentioned. Optimal concentrations of calcium, phosphorus, copper, zinc, manganese, magnesium, vitamin A, vitamin D protein, and energy ensure proper growth.

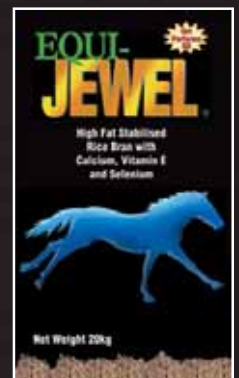
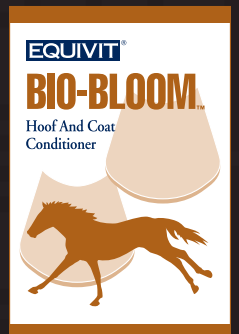
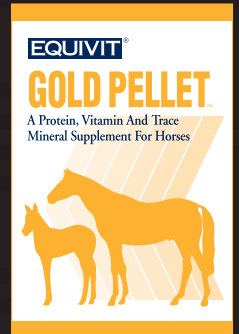
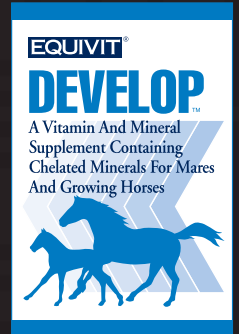
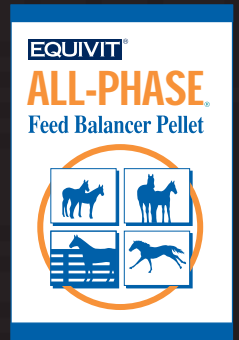
Protein plays a vital role in development. Diets low in protein, or with low protein-to-energy ratios, have resulted in failure to reach potential mature heights and reduction in bone mineral content, including smaller cortical area of the cannon bone. Commercial feeds are fortified with enough protein to meet the needs of specific phases of growth. For example, weanlings require higher concentrations of protein than yearlings. Oversupplementation with protein has not been proven to cause bone growth problems. However, there is an optimal ratio of protein or lysine to energy that appears to enhance proper growth.

The combination of rich pastures and oversupplementation with grain/concentrates may be one of the most common causes of DOD. Numerous studies have shown that when energy levels of 120 to 130% of the NRC recommendations are fed, the incidence of DOD is increased. These effects may be reduced by allowing plenty of exercise, showing again the vital contribution of exercise in young horses.

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A U S T R A L A S I A

Equine Q & A

Q I have been boarding my horse at a barn where he is kept in a small paddock. I am preparing to move him to another farm where he will be turned out on a well-established pasture with high-quality forage. How can I introduce my horse to the pasture without causing colic or founder?

A Lush pasture can contain 30% or more digestible energy. When excessive amounts of highly digestible and fermentable sources of energy reach the hindgut, they can disrupt the normal balance of microbes that break down the fibrous portion of the diet. This disruption can lead to gaseous colic or, in the most serious instances, laminitis.

A few simple steps should be taken before a horse is allowed to graze unrestricted on a new pasture. First, assess the condition of the horse. A horse that has fat built up along the crest of the neck, over the withers and back, and around the tailhead is likely overweight. Such a horse may be predisposed to laminitis when given all-out access to abundant pasture. Ideally, a horse should be maintained in a leaner, more moderate condition. One way to determine condition is to feel along the barrel of the horse for its ribs. If the ribs cannot be seen but can be felt, a horse is considered to be in moderate condition. If, however, it is impossible to feel ribs, the horse is probably overweight. Obesity can cause numerous health problems, so maintaining moderate body condition is advisable.

How much pasture your horse requires is not only determined by his body condition but also by his metabolic rate. Is he an easy keeper or hard keeper? That is, does he seem to gain weight easily, or does he have a difficult time maintaining weight? His metabolic rate affects his energy requirements. Horses with low energy requirements (easy keepers) may require less time on pasture than horses with higher energy demands (hard keepers). Body condition will play an important role in how the horse is managed on pasture.

Second, the pasture should be evaluated. Horses prefer to eat young plants, and fresh growth provides more energy than older stands of forage. Pastures that are overgrazed or contain tall, seeded-out grasses provide little energy to the horse. Variations in pasture quality may occur from season to season and even within a season depending on rainfall and other climatic conditions.

Once you have determined the condition of the horse and pasture, you can develop a turnout schedule. In addition to the pasture, you should have a stall or drylot available to keep the horse in during periods of pasture restriction. Throughout the acclimation period other energy-rich feedstuffs such as grain or alfalfa hay should be offered sparingly, if at all. If your horse is in moderate

body condition, begin turning out your horse for short periods of time (one or two hours) following a large hay meal. A horse may, for example, be allowed two or three periods of restricted turnout daily. Gradually increase the amount of time you allow the horse on pasture by hour or two-hour increments. In addition to a regimented turnout schedule, a grazing muzzle can be used to limit the amount of grass ingested. An overweight horse may have to wear a muzzle at all times when he is on pasture. The adaptation period may last 10 to 14 days, and the horse should be observed closely during this time for signs of colic and laminitis.



Horses unaccustomed to fresh grass may experience moderately loose stool due to the gastrointestinal tract's unfamiliarity with the high moisture content of fresh forage. This is not cause for concern. Once the digestive tract becomes fully adapted to the new diet, this side effect will diminish.

After acclimation to the new pasture is complete, continue to observe the horse for weight gain or loss. If you have a question regarding the nutritional management of your horse, ask a veterinarian or equine nutritionist. The advice of knowledgeable professionals can help you avoid potential problems with your horse. ☺☺

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3. Ricky MacMillan - Member of Australian dressage team at the 1998 and 2002 World Equestrian Games. Member of 2000 Australian Olympic dressage team.
4. Phillip Dutton - Member of the 2000 Olympic gold medal winning three-day event team. Represented Australia at the 2002 World Equestrian Games.
5. David Hayes - Champion Thoroughbred trainer in Australia and Hong Kong.
6. Olivia Bunn - Represented Australia at the 2002 World Equestrian Games in three-day eventing.



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Olympic gold medalist and international three-day event sensation Phillip Dutton doesn't demand too much of his mounts, only

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to fly,
to leap,
to outshine,
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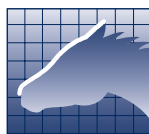


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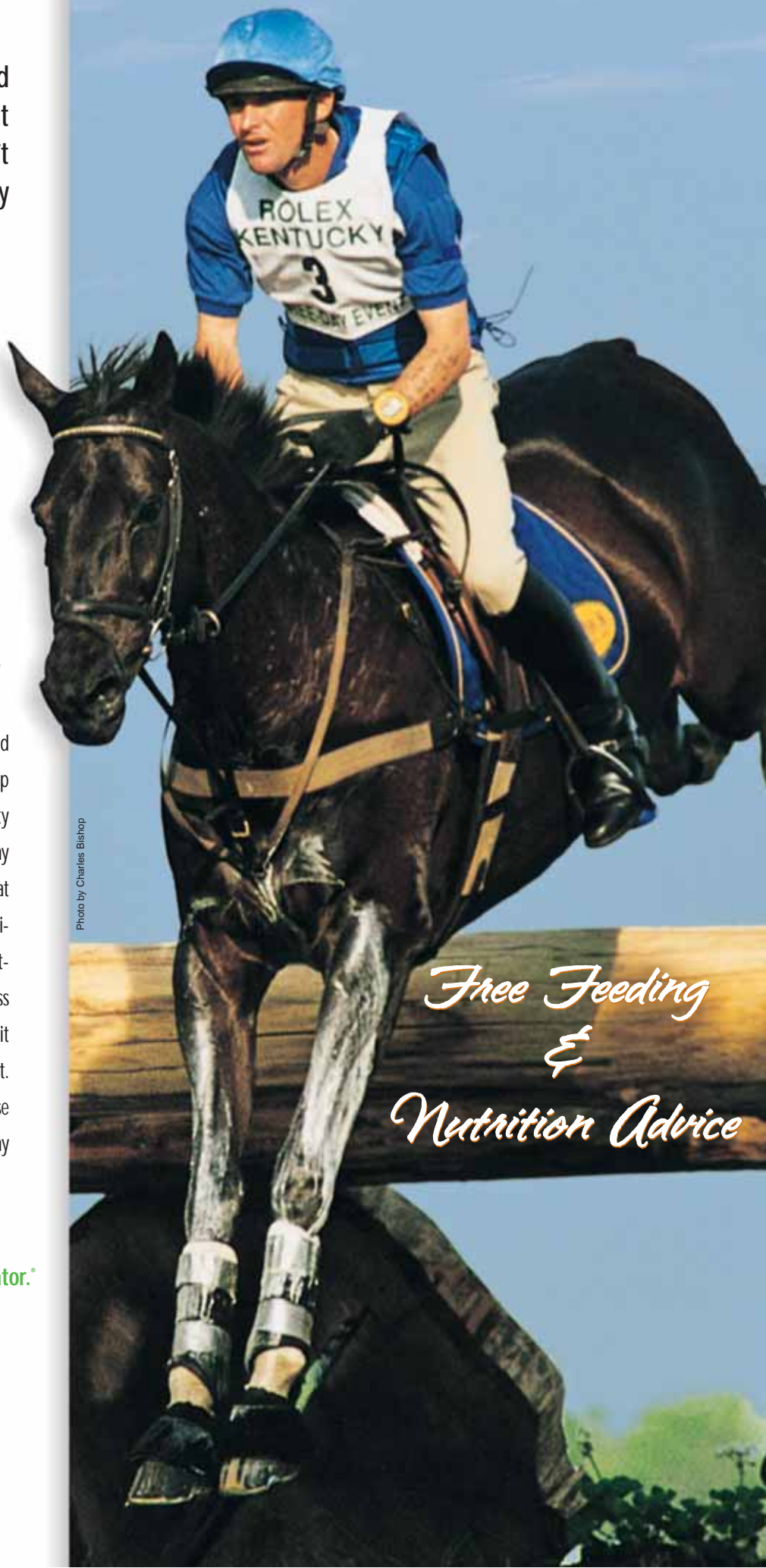


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