

KER's Spring Conference Addresses Feed Management



Catherine Bishop

Those that attended the KER spring conference for feed manufacturers participated in hands-on activities such as this demonstration of condition scoring.

From the lab to the barn

Scientists crunching numbers. . .horses crunching sweet feed. What's the common thread? Joe Pagan, equine nutritionist and president of Kentucky Equine Research (KER), believes that a primary goal of research should be to improve the nutritional management of performance horses. To accomplish this, it's important that research findings make their way from the laboratory to the feed manufacturer, then to the horse owner, and eventually into the horse's feed tub. Several presentations at KER's 2005 spring conference for feed manufacturers focused on the contributions of research in answering questions about practical nutrition management.

The lowdown on "low-starch" feeds

Pagan started the first day of the conference with an explanation of low-starch feeds. Hardworking horses are given grain, he said, to provide energy over and above what is supplied by grass or hay. While feeds may contain various ingredients, the horse derives digestible energy from only three sources: carbohydrates, fat, and protein. Among these, fat and protein have a relatively narrow range of energy density, while the energy density of various types of carbohydrates can range from around 10% to more than 80%. Carbohydrates can also be classified as nonstructural (exists as, or can be broken down into, simple sugar) or structural (must be broken down by hindgut fermentation, the source of volatile fatty acids). Nonstructural carbohydrates are often referred to as "starch." The horse uses

both sugar (glucose) and volatile fatty acids to fuel exercise.

There's nothing intrinsically wrong with starch, Pagan emphasized, and the vast majority of horses get along fine with a traditional grain mix in which starch is easily digested and contributes a large proportion of needed energy. As long as a horse is not allowed to consume too much grain in one meal, feeds containing cereal grains are usually well tolerated.

However, research has shown that, for some horses with very specific metabolic disorders, starch is not the safest energy source. For example, recurrent exertional rhabdomyolysis (RER), a disease with a probable genetic factor, causes severe muscle cramping, or tying-up, due to a disorder in releasing and clearing calcium during muscle contraction. In cooperative studies conducted by KER and Dr. Stephanie Valberg of the University of Minnesota, horses with RER had significantly fewer episodes of tying-up when they were fed a low-starch diet. This research led to the development of Re-Leve[®], the very first low-starch formulation. Produced by Hallway Feeds, Re-Leve is used with excellent results by many leading Thoroughbred trainers as well as the caretakers of top performance horses.

Another serious problem for young horses is developmental orthopedic disease (DOD). Young horses are often crippled by one of the most common manifestations, osteochondritis dissecans (OCD), which is marked by improper maturation of cartilage into bone tissue. KER conducted studies in which growing horses were weighed and measured over a period of many months. Results from the large sample showed a significant increase in OCD

among young animals that were taller and heavier than their peers. Another finding was that feeds producing a higher glycemic response induced a rapid surge in plasma glucose and insulin after meals and were linked to higher rates of OCD than feeds causing a less dramatic blood response. A low-starch feed formulation was recommended as a possible solution, and breeding farms following this suggestion have reported a measurable drop in OCD cases with subsequent foal crops.

Polysaccharide storage myopathy (PSSM) is a condition in which large amounts of glycogen are stored in muscle tissue but can't easily be mobilized for energy. Cushing's disease and metabolic syndrome are different maladies with somewhat similar manifestations: excessive body fat and a tendency toward laminitis. Use of a low-starch feed produces marked improvement for many horses with these health problems.

Although low-starch formulations have proven beneficial for horses with a variety of problems, Pagan stressed that reducing the starch content of the feed is neither helpful nor desirable for every horse. Some highly touted products recently introduced to the market have simply reduced starch levels, resulting in feeds that fail to provide the energy required for growth or performance. A better solution is a formula such as Re-Leve in which some of the grain is replaced with fermentable fiber (beet pulp, soy hulls) and dietary fat (rice bran, vegetable oils) in order to provide easily utilized energy sources without risking starch overload.

"Some low-starch products seem to have jumped onto the bandwagon a little too late, picking up the phrase but completely missing the point," Pagan observed. "A low-starch feed shouldn't become a low-energy feed. If it does, owners will have to feed a lot more of it to meet their horses' requirements." He explained that any feed containing less than 45% starch may inhibit muscle glycogen storage, thereby limiting performance. Owners who use a low-starch product are advised to investigate the digestible energy level of the feed as well as the source of that energy.

For a more in-depth look at low-starch feeds, check out the article that begins on page 10 of this issue, "Keeping Tabs on Carbs."

Focus on fat

"Why would you want to feed fat to a horse?" asked Dr. Kathleen Crandell, KER's Virginia-based equine nutritionist. Her answers contained some surprising facts. Far from being a novel feed ingredient, fat is a natural component of the equine diet. In fact, fresh grass, the most basic of all feedstuffs, contains from 2% to 5% fat!

Vegetable oils—corn, soy, flax, sunflower, safflower—are up to 95% digestible by horses. Oil is easily utilized by the horse and is extremely palatable. Solid feed ingredients that deliver high levels of fat include rice bran, ground flax, and lupins. Animal fat is lower in both digestibility (about 75%) and taste appeal, but the powdered form is convenient and can successfully be added to manufactured feeds in small amounts.

Lacking an equivalent of the human gall bladder, the horse produces bile in the liver and sends it directly to the small intestine. There, ingested fat is converted to short-chain fatty acids, an excellent source of energy that can be used immediately to fuel exercise. Energy that is not burned right away is stored as body fat.

As a component of every cell in the body, fat is important to a horse's growth, development, and overall health. Fat is essential for the transport and absorption of some vitamins, and is also a building block for many hormones and enzymes. Perhaps the most important reason to add fat to equine diets, according to Crandell, is its ideal suitability as a fuel for long-term exercise.

"Research at KER indicated that horses on high-fat diets had better endurance than those eating traditional feeds," she explained. The substitution of corn oil for dietary starch led to decreased cortisol and lactic acid production following exercise. The inclusion of Equi-Jewel rice bran, which contains a high level of fat, resulted in lower exercising heart rates and subsequent shorter recovery periods following exercise. Add these findings to the fact that the metabolization of fat produces less body heat than starch, and it's easy to see why high-fat rations continue to gain popularity among owners of equine athletes.

"Horses that can benefit from high-fat feeds include those in endurance races, eventing, dressage, or any type of aerobic work," Crandell concluded.



Catherine Bishop

Building a stronger skeleton

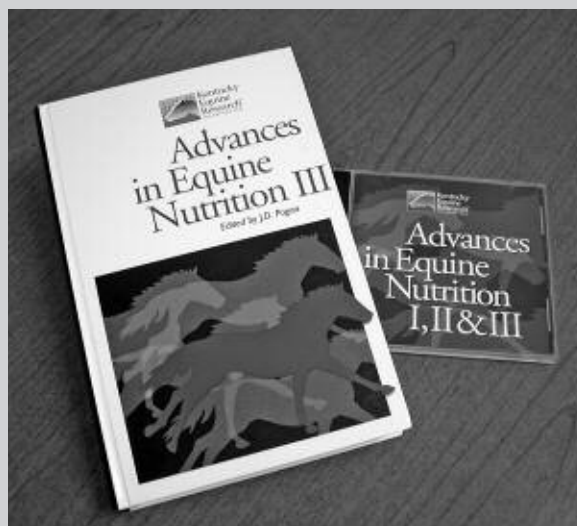
As they enter training, young racehorses frequently experience skeletal problems that interrupt their work schedule. Dr. Larry Lawrence's presentation detailed KER's studies of bone density testing, remodeling of bone in response to exercise, and the influence of nutrition on skeletal health. Radiographs are used to measure bone mineral content by relating the opacity of the image to a known standard. KER also uses ultrasound to determine bone mineral content, with the advantage that the results are known more quickly. Ultrasound also yields an estimation of the ratio of mineral to protein in the bone, a factor that is related to breaking strength. When many young horses are examined, differences may show which horses are physically more ready to begin an exercise regimen. Made available at yearling sales and during early training, this information might help to avoid lameness and breakdowns at the track.

Lawrence explained that mineralization of bone does not proceed in a steadily increasing plane as a horse grows. Weaning, for example, causes a temporary setback. Nutrition and exercise levels also influence the rate at which bone matures. As researchers utilize new technologies to follow skeletal changes, they have discovered a startling truth: when two-year-old horses go into training and move from pasture to full-time stalling, their bone mineral content can drop to the level of a 9-month-old foal before the remodeling process swings back to a bone-building mode. Some of the research currently underway at KER is evaluating nutritional and management techniques that could positively influence bone strength as horses grow and mature.

A hands-on approach to body condition scoring

Skies threatened rain on the second day of the conference, but a few raindrops didn't stop Lawrence from demonstrating body condition scoring to an interested group of conference attendees. As handlers led out a rotund pony and a trim Thoroughbred, Lawrence pointed out that the two equines differed by over two hands in height, but less than a hundred pounds in body weight. Condition scoring charts in hand, visitors were invited to step up and probe for ribs (should be easily felt, but not seen, for a horse in moderate condition); backbones (sticking up on a thin horse, sunk into a fleshy trench on an obese animal); and fat pads (almost every horse has some fat, but how much is too much?). Lawrence pointed out the discrepancies between absolute weight as determined by a scale and estimated weight from a weight tape, but concluded that it's important to monitor both weight and body condition. For some horses, the ideal feeding plan may include low-starch, high-fat formulations; others will thrive on simpler, more traditional feeds. In any case, horses should be evaluated as individuals, and owners should design exercise programs and feed management to keep each horse in the best condition for optimum health and performance. ☺

Advances in Equine Nutrition III Released



Advances in Equine Nutrition III has arrived! The book, which serves as a companion piece to the first two volumes, is a compilation of material presented at annual Kentucky Equine Research Nutrition Conferences for Feed Manufacturers. This third volume includes information from conferences held from 2001 to 2003.

Featured in the book are articles that detail the role of nutrition in disease management. Several health concerns are highlighted: colic, laminitis, developmental orthopedic disease, Cushing's syndrome, muscle and nervous system disorders, respiratory disease, hoof health, and more. Articles are written by the professionals at KER (Drs. Joe Pagan, Kathleen Crandell, Peter Huntington, and Larry Lawrence) as well as international authorities on nutrition and its effects on health such as Drs. Stephanie Valberg, Ray Geor, Laurie Lawrence, Ken McKeever, Ric Redden, and many others.

Extensive coverage of skeletal development and abnormalities is provided by leading researchers C. Wayne McIlwraith and Elwyn Firth.

This 503-page hardcover book includes complete reference lists for each article and a comprehensive index. In addition to the book, a CD that contains the complete content from Advances in Equine Nutrition, Vol. I, II and III is available for purchase. Order the book, CD, or both from www.ker.com or call 1-888-873-1988.

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