

Director's Digest

FATS AND PROTEINS RESEARCH FOUNDATION, INC.



DR. GARY G. PEARL D.V.M.
Director Technical Services

16551 Old Colonial Road
Bloomington, Illinois 61704
Telephone: 309-829-7744 FAX: 309-829-5147
<www.fprf.org>

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CURRENT FINDINGS IN EQUINE NUTRITION

Lisa Wolters

This equine nutrition article appeared in the April 1996 Hunter & Sport Horse magazine. Ms. Wolters has given her permission to reprint as a FPRF Director's Digest. The material was based on interviews and discussions with Dr. Gary Potter at Texas A&M University. Dr. Potter has completed a number of projects under sponsorship from FPRF. He is a very noted equine nutritionist, and this article serves as an excellent review and reference for modern equine nutrition which includes the use of feeding fats.

Nutrition

Your horse's coat gleams in the afternoon sunlight as you start his workout, his outer appearance mirroring his inner health. You marvel at his stamina, at how breaking a sweat does not debilitate him, how he keeps going, year after year, without suffering from unsoundness. Yes, you muse contentedly, scientific research in equine nutrition is indeed a wonderful thing.

Okay: so that probably isn't your first thought, or even your second or third. But proper nutrition *does* play a vital role in keeping horses healthy. Without continued research in nutrition, and the breakthroughs which such research has yielded, horse people would still be clinging to hearsay rather than fact—and scratching their heads when performance horses broke down in their prime, none of their broodmares got in foal, or their older horses slowly wasted away.

Good nutrition is by no means a cure-all; it can, however, ward off many of the problems that have traditionally plagued us. So, what's new in the world of nutrition research, you ask? According to Dr. Gary Potter, Ph.D., Professor-Leader, Equine Science at Texas A&M University for over 25 years and a nationally-renowned equine nutritionist, the answer is, "a lot." In this article, Dr. Potter will fill you in on current findings for performance horses, breeding horses, young horses, and the geriatric crowd, as well as debunk some commonly held assumptions about nutrition.

Performance For All Ages

"The biggest recent and continual focus in nutrition research is related to delaying the onset of fatigue in performance horses, increasing their stamina through better nutrition, and finding ways to reduce the thermal load while maintaining proper fluid/electrolyte balance," Dr. Potter notes. "A lot of this research is also related to finding new ways to minimize injuries." Texas A&M is one of several universities researching the relationship between bone metabolism and injury, especially in young horses.

Nutritionally speaking, energy is what you should feed for improved performance in such high-velocity/short-term sports as eventing and jumping. Dr. Potter continues, "When your horse engages in these kinds of activities, his energy requirements may exceed his capacity to produce energy aerobically, and, in order to get enough energy to the muscle cells, the horse must produce energy anaerobically. For performance horses, then, the question is how to potentiate this process—how to get them to produce energy both aerobically and anaerobically—and how to use this greater fuel supply. The bad thing is that when your horse expends this much energy, there is a tremendous amount of waste products, notably lactic acid, which limits the amount of time your horse can perform at his highest level."

Through feeding fat, Dr. Potter notes, researchers have been reasonably successful at manipulating and enhancing horses' capabilities. "We have been most effective at meeting horses' aerobic needs," he says, "through feeding fat. This has a sparing effect on the horse's supply of fuel for anaerobic work. Horses become better adapted, metabolically-speaking, and more glycogen is stored in the muscle. Glycogen is the fuel for anaerobic work, which allows the horse to perform for longer periods of time. Also, feeding additional calories in the form of fat reduces the amount of heat the horse produces. If you increase the amount of fat in your horse's diet, you'll also need to feed him less to get those high-performance, high-energy results."

Studying Sweat

As your equine athlete performs, he also sweats—profusely—due to his body's thermal regulatory responses. Not only does he lose water, he also loses electrolytes, which are partly made of sodium, potassium and chloride. Over the long term, he can become deficient in these substances.

"We're just now getting around to quantifying the amount of sweat horses lose," says Dr. Potter. "Once we know what the average performance horse's sweat loss is, we can then learn how to provide sufficient electrolytes in the diet to meet that known sweat loss. We are just now beginning to understand how this works. It appears that horses' electrolyte needs can be met through the diet. At this point, it does not appear to be necessary to put electrolytes into their water or to administer electrolytes through an I.V. The concern with putting electrolyte tablets in their water is that it may actually keep horses from drinking as much as they should. If we can add the proper amount of electrolytes in the horse's everyday feed, these concerns will disappear."

Feeding To Reduce Injuries

The study of bone injury prevention in young horses is, from a nutritional standpoint, a comparatively new line of research. According to Dr. Potter, it's also a vital one. "One-half to two-thirds of all young performance horses suffer from some sort of bone injury in their early training," he reports. "These injuries can cost them a few days' training or be as severe as actual bone breakage. The numbers are too high by any assessment. In anticipation that society in general and horse folks in particular won't tolerate this situation much longer, researchers are trying to learn about the whole bone remodeling process and the growing horse's nutritional needs for sound bone growth.

"At about the same time that a young horse starts his training, his bone structure begins a demineralization process, which is brought on by his increased workload. In racing, for example, right about the time the trainers start asking their youngsters to sprint—about 40 to 50 days into their training—the horses' bones are at a comparatively demineralized state, and that's when most bone injuries occur. There is a definite correlation between the amount of time spent in training and bone demineralization. Scientists are trying to determine wheth-

er or not a youngster's calcium requirements change during this time, and how to ameliorate the impact of this change through nutrition as well as via the training regime. Hopefully, we will have enough data three to five years from now to say for sure what horse owners can do from a nutritional standpoint to minimize skeletal injury in their young horses.

"Proper skeletal development is a significant factor in developing sound adult athletes. The period in your horse's life from weaning to about three years of age is critical to his future soundness . . . There are stress factors in a young horse's life that we simply must understand better. We have got to be able to 'grow' a better skeletal system that is appropriate to the type of sport the horse will be expected to perform in.

"A common misconception among owners is, if they suspect that a youngster has a growth-related skeletal problem, they should reduce his feed intake. This isn't always true; reducing his feed can reduce the vital bone mineralization process. Horses with a genetic predisposition for bone disease must be managed differently than the genetically normal horses. If the horse is genetically normal, do not just restrict the amount of energy you feed him; put him on a free-exercise management system and feed him a balanced diet!

"The bone maturation process can extend to the horse's fifth or sixth year depending on his breed, and certainly until he's three or four. If you want to increase his odds of staying sound as an adult, think of feeding to increase his bone density and mineralization, *not* his weight or size. When your horse is two or three, you can too-easily prepare a 'super-charged engine on a Volkswagen frame'—this is, a horse with the ability to generate a lot of power that his skeleton cannot hold. Such a horse will eventually break down. Through proper nutrition, build your youngster's 'transmission' as well as his 'engine!'"

Breeders and trainers will have to ask themselves some hard questions, says Dr. Potter. "Ask yourself if you really want to keep the ones that break down during training, in your breeding pro-

gram. That is a very hard question to answer when horses are your business, but skeletal weaknesses can be passed on to the offspring."

Preventing Colic

Colic is another serious concern of all performance horse owners. "Recent epidemiological studies are confirming our knowledge about what causes colic," Dr. Potter says. "We have 'known' certain things from years of horse owners' and veterinarians' experiences, but for the first time, we now have the scientific studies to back up that information. There have been several studies done recently on the digestion, for example, the effects of specific kinds of feed on the upper versus the lower intestine. We know that colic is a management problem; what we are trying to do now is define its limits, so that horse owners will know exactly what to feed their horses, and how often, and in what amounts, in order to prevent colic in any of its forms."

The Next Generation

Nutritional studies done on breeding horses have not been given priority in recent years. So, says Dr. Potter, "There have been no dramatic findings as of late." Most dramatic breakthroughs were made 10 to 20 years ago, and are now common knowledge among horse people. The most significant findings, he notes, have had to do with the ideal body composition for broodmares.

"The broodmare's breeding condition affects her reproductive health dramatically," he says. "Until relatively recently, the commonly-held falsehood was that it was best to get your mares thin prior to breeding, then feed them to gain during the breeding season. Now we know that, from a nutritional standpoint, they should be in good condition year-round. It's especially bad to let a mare get thin when she's got a foal on her, and when you're planning to breed her back. But it is not a good practice with an open mare, either.

"On a statistical basis, we've raised the pregnancy rate in mares to 95 percent or higher by changing this feeding practice. The mare's body is sensitive

to inadequate fat stores; when it senses an inadequacy, it shifts into a starvation mode. The first system this process affects is the reproductive system, and the last is lactation. Early abortion is also tied in to this.

"As for stallions," he continues, "there hasn't been a lot of nutritional research done, and there needs to be more. It's important for stallion owners to remember that these horses have the same nutritional needs as a performance horses in light training. But exactly how diet affects sperm production and breeding ability hasn't been studied. Historically, stallions have been fed vitamin E to increase sperm production, but validity for that practice was put to rest by a study at Colorado State University recently, when they showed that feeding vitamin E has absolutely no effect on a stallion's reproductive abilities if the stallion was not deficient in vitamin E."

Feeding Older Horses

Some research has recently shifted to horses in their mid-20s and beyond.

"Horses today are living to a more advanced age, and this has stimulated nutritional research by both universities and feed companies," explains Dr. Potter. "The question we are trying to answer is: How can we better serve their needs? Older horses exhibit a lot of wear on their teeth, and may even be missing teeth. Their inability to chew properly affects their ability to digest food. Their digestive systems also slow down with age. The decrease in gut function, and the role it plays in proper nutrition for geriatric horses, isn't very well understood.

"That's why there's been interest in processed feed for older equines, with several tests and trials done on the digestive process. There are several ways to process feed: extrusion, pelleting, and rolling, for example. Feed companies, naturally, have been extremely interested in determining which of these processes works best for older horses, and

they have introduced several complete feeds for old-timers onto the market."

Misconceptions & Future Truths

Both feed company spokespersons and equine nutritionists are continually battling a number of feed-related misconceptions held by the horse-owning public.

"The single biggest, most persistent misconception is that the quality of the horse's diet is determined by the percentage of protein in it. This is mostly not true," Dr. Potter reveals. "High protein does not necessarily equal high quality. While this long-held assumption may hold true for young horses (those age two and under), it is almost impossible to create a protein deficiency in an older, well-fed performance horse. With a mature horse, if you assume that a 10 percent protein diet is adequate for him when he's at rest, you do *not* need to feed him 16 to 18 percent protein when you increase his workload. To meet his increased energy needs, don't increase his protein; feed more carbohydrates and fat.

"The danger in feeding extra protein is that, as it is digested and absorbed, the nitrogen is excreted through the kidneys, which takes energy away from other processes. It is not necessary, and can be counterproductive. Smaller amounts of protein, therefore, may be better, as in feeding less alfalfa, which can be very high in protein, to performance horses.

"Another misconception is that of the 'magical' supplement, the one that is going to bring your horse to a nutritional Utopia. The advantage to feeding any particular supplement is limited to the chemical composition of that supplement. In other words, use it for what the manufacturer says it's supposed to be used for. If your horse already has a well-balanced diet, it's useless to feed redundant supplements and will complicate your horse's nutritional balance.

"Iron is frequently over-supplemented in an attempt to increase the horse's red blood cell count. But supplement-

From The Ivy Halls To Your Feed Room

So where, exactly, does all of this scientific study take place? Who does the work, and who is paying for it?

Most of it is done at academic institutions," says Dr. Potter, "but some is also done by the private companies. Feed companies, for example. This is as it should be; the bulk of the research *should* be done by objective, outside entities. This gives the horse-owning public the most objective data for their money. Most nutritional research, or equine research of any kind, is not funded by appropriated federal or state funds. It is funded mainly by the grant-in-aid process.

"The horse industry *must* come up with a way to finance research, to support itself," Dr. Potter asserts. "The way society is moving away from funding anything as a matter of course, it would be beneficial to the research—and to our horses' health—to be funded from within the horse industry."

ing iron works only if the horse has an actual iron deficiency. Most people supplement out of fear that they're leaving something out of their horse's diet. But it can be worse to over-supplement than to never start! Over-supplementing can set off physiological mechanisms which can actually *create* a nutritional imbalance; the most well-known of these is the calcium:phosphorus imbalance.

"Supplements do, in fact, have a place in equine nutrition," Dr. Potter adds, "when a deficiency actually exists. Good hay, grain, and water are the basis for an ideal equine diet, but they do have their limits, and supplements are sometimes needed. But keep in mind

that you can't supplement your way to the winner's circle."

When To Feed

How then should you provide your horse with the best nutrition possible?

Dr. Potter reminds horse owners not to overlook the importance of a regular feeding schedule. "Be sure that feed intervals are kept the same. It's natural for the horse to eat constantly, and this keeps his digestive stress to a minimum. Twelve-hour intervals have long been standard practice, and now we're finding that eight-hour intervals (three feedings a day) are even better. That's another important point: horses that are fed three meals a day should not be fed simply morning, noon and night. Feedings should be spaced at those eight-hour intervals.

"How much can a horse safely eat at one feeding? In grain amounts, this should never exceed .75 percent of his body weight. The smaller the amount of grain fed at each meal, the better. If you need to feed your horse more, feed him smaller amounts more often. This is also an important management factor in reducing the risk of colic.

"For hay, a horse should not receive less than three-quarters of a percent to one percent of his body weight in hay per day, but he can be fed more. As with grain, three feedings per day are better than two, and 'smaller amounts, more frequently' is the rule. And do not forget to check your horse's teeth regularly. They are an essential part of this digestive process!"

In the future, Dr. Potter foresees several vital areas of nutritional research. "Presently, we don't have enough information about horses' specific vitamin requirements, or about the specific amino acids in protein that are required by horses, particularly by youngsters in relation to their skeletal development," he notes. Geriatric nutrition will continue to be a fruitful field of research as horses are being better cared for and are living longer, more active lives. But the most important area to focus on is the young, immature horse that is put into training. We must find a way to feed those young horses in a manner to promote sound skeletal development." ■