Kentucky Equine Research®
World Leaders In Equine Nutrition

Advances in Equine Nutrition

Volume I

Edited by

J.D. Pagan

FEEDING THE WESTERN PERFORMANCE HORSE

STEPHEN G. JACKSON
Kentucky Equine Research Inc., Versailles, Kentucky, USA

Summary

Feeding the western performance horse in a manner consistent with nutrient requirements is predominantly a function of properly identifying energy needs. This class of performance horses may have energy requirements ranging from maintenance to energy requirements similar to those of the race horse in intense training. Although energy is not the only nutrient for which there is an increase in requirement as work intensity increases, for many of the other nutrients increased requirements associated with work are met simply by increasing feed intake to meet the increased requirement for energy. In reality the main nutrients other than energy that must be dealt with specifically are electrolytes, trace minerals, and vitamin E.

Introduction

Western performance horses in the US probably are the most numerous of the performance horses being ridden and trained. Activities and level of work intensity within an event or activity vary widely from the recreational western pleasure horse to the professional reining horse or NCHA caliber cutting horse. As such, accurate identification of nutrient needs is sometimes difficult. For example, the amount of feed necessary for the very solid non-pro reining horse may be totally inadequate for a horse in intense reining training headed for the Derby or Futurity. It is necessary to try to group these horses by event and work intensity to establish a base-line set of feeding recommendations and make adjustments depending on individuality, actual response to work and training and on the role that forage plays in the overall feeding program. To do this I have taken the liberty of dividing the typical western event into light, medium and intense categories of work and have then given a best estimate of the requirements for these levels of work. Due to the critical role that forage plays in any horse's diet, I have separately discussed forage and have tried to reinforce that when talking about specific classes of horses. Finally, I would be remiss if I did not mention body style when discussing the feeding programs for some of these performance horses since nutrition plays such a large role in the perceived frame that these horses go in.

The forage component

The loss of horses in the western performance horse industry to colic and laminitis is large. These losses are due in large part to the failure of the horseman and trainer to realize the critical aspect of adequate fiber in the horse's diet. Not only can fibrous feeds meet a large portion of the horse's nutrient needs for all classes of nutrients but also the "balanced cecum" can serve as a tremendous buffer against gut pathology and dehydration. The best estimate of voluntary forage intake by horses is somewhere between 3 to 4% of body weight per day in forage dry matter. Using these numbers, it is likely that many of the western performance horses could meet most of their nutrient requirements using a diet of good quality fiber alone. This kind of feeding program in the industry is certainly the exception rather than the rule. I know of trainers in Arizona using alfalfa pellet alone, in California using alfalfa cubes alone and personally have fed only hay and a "guilt cup" of feed to western pleasure horses in training.

Table 1 shows the predicted energy value of some commonly fed hays for horses.

Table 1. AVERAGE DIGESTIBLE ENERGY AND PROTEIN CONCENTRATIONS IN HAYS COMMONLY FED TO HORSES (DRY MATTER BASIS).

Forage	*DE*	*Protein*	*Forage*	*DE*	*Protein*
Alfalfa	1.1	20	Timothy	0.7	7
Coastal	0.9	11	Clover	1.0	15
Oat	0.8	9	Bahiagrass	0.8	8
Lespedeza	1.0	18	Fescue	0.9	12
Mixed	1.0	15	Pangola	0.8	9

Assuming that energy requirements for these horses range from 18 Mcal to 34 Mcal of digestible energy (DE) per day, it is easy to see that many of the horses in question can meet their energy requirements from hay alone. For example, if a horse requires 20 Mcal of DE per day it would have to eat 28, 20 and 16.5 lbs. of hay per day that contained 0.7, 1.0 and 1.2 Mcal of DE per lb. respectively. Assuming the horse weighed 1100 lbs these intakes would represent 2.5, 1.8 and 1.5 percent of body weight per day in hay intake. These numbers are well within the capacity of the horse to eat hay. Even though these numbers work in theory, in practice this feeding management routine is the exception rather than the rule due to tradition, ease of feeding and lack of availability and storage for these amounts of hay in many parts of the country. Therefore, a practical thumb rule is to always meet at least 50% of the western performance horse's energy requirements with fibrous feeds with an absolute minimum forage intake of 1% of body weight per day. Adhering to theses "rules" will result in greater economy, fewer gut problems, fewer stable vices and probably most

importantly, in a happier horse.

The horse doing light work

Western performance horses that fit into the light work category include:

Western pleasure horses
Trail horses
Recreational roping horses (less than 6 head per day)
Equitation horses
Western riding horses

There may be instances when horses used in other events fit into this category and times when horse listed above may fit better into the moderate work category but for purposes of a basic discussion of nutrient needs and feeding management, these horses group quite nicely. Table 2 shows a basic list of nutrient requirements for horses that have been grouped in this category and for comparative purposes maintenance requirements have been listed as well.

Table 2. DAILY REQUIREMENTS FOR SELECTED NUTRIENTS FOR WESTERN PERFORMANCE HORSES DOING LIGHT WORK (1100 LBS MATURE WEIGHT)

Nutrient	*Mature*	*Two Year Old*	*Maintenance*
Dig. Energy (Mcal)	20.5	22	16.4
Crude Protein (g)	820	900	656
Calcium (g)	25	29	29
Phosphorus (g)	18	16	14
Magnesium (g)	9.4	8.2	7.5
Potassium (g)	31.2	28	25
Selenium (mg)	1.5	1.5	1.0
Vitamin A (IUx1000)	22	20	15
Vitamin E (IU)	600	600	500

It should be obvious that the difference in nutrient requirements between maintenance and horses doing light work is actually quite small. The maintenance requirement for DE for the size of horse listed is 16.4 Mcal of DE while light work is 20.5 Mcal, a difference of 4 Mcal or roughly 6 lbs of grass hay, 4 lbs of legume hay or 2.5 lbs of a typical sweet feed. Protein requirements are a mere 164 grams over maintenance and the other nutrients follow this trend. For all practical purposes, a two year old in training doing these types of work can be treated as a mature horse in terms of the types and amounts of feed required to meet nutrient needs.

Now that the nutrient requirements are stated the real challenge is to convert these

numbers into a practical feeding program. Recall that we are going to meet at least 50% of the DE requirement with hay and or other fibrous feed. This would mean that for horses doing light work at least 10 Mcal of DE per day is going to be provided by hay. Going back to Table 1 this would mean that we would start with a basal ration of 14 lbs of timothy or coastal hay, 12 lbs of a mixed alfalfa/grass hay and 10 lbs of a straight alfalfa, lespedeza or clover hay. The remaining energy required over and above that provided by the hay would be 10 mcal of DE. Therefore, assuming that most concentrate rations provide 1.4 Mcal per lb. this would mean that the horse would be fed 7 lbs of grain per day. This is pretty close to the average grain intake that one might see fed to these horses on a practical basis.

At this point we have really only considered energy in the feed intake equation, and obviously there are other important nutrients. It is very difficult to make protein a real factor if practical diets are being fed in amounts adequate to meet energy needs. My general suggestion to horsemen is to feed a 12 - 14% protein grain mix to all performance horses and that when energy requirements are being met then nearly by definition, protein requirements are met as well. For example, assume a 7% protein timothy hay was being fed (14 lbs from above example = 6.3 kg) and a 12% grain mix at 7 lbs per day, 3.18 kg. Protein intake would be as follows:

hay 6300 g x .07 = 441 g/d
grain 3180 g x .12 = 381 g/d
total protein intake = 822 grams/day (required = 820 g)

It is apparent that even when horses are being fed a relatively poor quality timothy hay, protein requirements are being met using a 12% protein grain mix. The important thing here is for people to understand that at least when grass or grass/legume mixed hays are being fed, it does not really matter if a 12, 13 or 14% protein grain mix is fed. Feeding a 13 or 14 % grain mix in the above example would mean an increase in 32 and 64 grams per day respectively. This difference is of academic significance only but it seems that people really get hung up on this protein thing.

The other nutrients in the diet fall in line if one is feeding a well formulated, fully fortified feed. A typical nutrient profile one might encounter for one of these feeds is 0.65 % calcium, 0.5 % phosphorus, 0.25 % magnesium, 0.3 ppm selenium and 4,000 IU/lb vitamin A. If the concentrations of the above nutrients, plus or minus, are in the feed then one can be assured that the requirements for all nutrients are being met. There really should be no need for supplements for these horses other than for the ones discussed at the end of this paper that have application for all classes of performance horses. The obvious exception is salt. Even though most manufacturers would include salt as 0.5% of the grain concentrate, it is a good idea to provide a free-choice trace-mineral salt source, either loose or block to all horses, even those not in work.

Besides using a fortified textured or pelleted feed, many people like to use bulk grains as the concentrate part of the ration. Even though this is perfectly fine in terms

of meeting energy requirements, the macro and micro mineral requirements are not generally met using this method of feeding. If on the other hand, grain plus 1-2 lbs per day of a supplement pellet (ie KER ALLPHASE or VI-PRO-MIN) is used all nutrient requirements are generally met. These mixing or supplement pellets are generally available from most manufacturers and are very highly fortified and formulated to address the deficiencies in cereal grains. This method of feeding allows a trainer, producer or horse owner a great deal of flexibility in the feeding program as energy and other nutrients are unlinked. One can then start with a "daily unit" of pellet and add that amount of grain necessary to achieve the appropriate body condition for the individual.

Some last thoughts on feeding this group of performance horses: Even though these horses are not doing a great deal of work in terms of caloric expenditure, they are still athletes. Flexibility, muscular fitness, cardiovascular fitness and soundness are still of extreme importance. It is rare that we see a flexible, fit, cardiovascularly fit, fat athlete. As such for these horses to carry excessive finish or fat can only be described as potentially detrimental to their performance. The modern "look" for a pleasure horse is sleek, streamlined and hard. The definition of the really good performance horse is elegance, symmetry and balance. This definition is difficult to achieve in the fat horse. Just as fit and fat are different for the halter horse, fit and thin are different for the performance horse. Judges have been instructed by breed associations to discriminate against horses that look emaciated, dull and worn out and that appear to be intimidated. The way to get a horse that is supposed to go slow to do so is through appropriate training and NOT through starvation. It takes energy to be balanced, round, cadenced and pure in movement. These attributes of the western performance horse are not achieved by restricting feed and/or water intake. In conclusion for the horse being trained, shown and worked in the events that I have indicated are light work, it is energy balance in the individual that ultimately is going to be the critical aspect of getting the job done right. "The eye of the master fattens the ox." Thumb rules concerning the feed intakes predicted to be required for these horses are meaningless without the horsemanship of the feeder.

Feeding for moderate work

All but a very select few of the remaining western performance horses can be put in this category. Events covered in the moderate work category would be:

Reining
Working cow horse
Cutting
Ranch work
Pole bending
Steer roping (> 6 head per day)
Calf roping
Team penning
Barrel racing
Steer wrestling

This category contains the largest portion of the real using horses, horses that have speed and anaerobic metabolism as any significant component of their work. The training program for these horses when compared to the typical pleasure horse or trail horse would generally consist of longer and more intense daily training sessions and more intensity of work during the event at the horse show. A greater amount of aerobic as well as anaerobic fitness is required for these horses when compared to those horses doing light work. Even with individual variation in the actual amount of feed these horses take to maintain energy balance, requirements presented in Table 3 are a good place to start when trying to establish feeding programs that meet nutrient requirements for horses engaged in these activities.

The 1989 NRC suggests that 50% of the diet of horses doing moderate work may be comprised of forage and 50% of grain. As for horses doing light work there are certainly instances when horses are consuming high quality forages (good pasture or legume hay) when all of the protein and energy requirements may be met by the forage component of the diet. Most of the time when this is possible, it is when horses are maintained outside on pasture except when they are being ridden and trained. This is just simply not how the majority of western performance horses are managed. More frequently than not horses in training for or being shown in western performance events are housed in stalls with limited if any turn-out and this fairly well necessitates the feeding of grain. Assuming that 50% of the DE requirements can be met by hay and that these horses require 24 Mcal of DE per day then 12 Mcal must be provided by hay and the remaining 12 by grain or concentrate. Going back to our previous assumptions the 12 Mcal required from the hay or forage portion of the diet could be provided by 17 lbs, 12 lbs and 10 lbs of grass, mixed grass/legume and legume hays respectively, these figures would represent 1.7, 1.1 and 0.9 % of body weight per day respectively for the 1100 lb horse. These kinds of hay intakes are certainly well within the capability of the horse to consume fibrous feeds. Using our 1.4 Mcal/lb figure for grain mixes, grain intake for horses doing moderate work would need to be in the neighborhood of 9 - 10 lbs/day.

Table 3. DAILY REQUIREMENTS FOR SELECTED NUTRIENTS FOR WESTERN PERFORMANCE HORSES DOING MODERATE WORK (1100 LBS. MATURE WEIGHT).

Nutrient	*Mature*	*2 Year Old*
Digestible Energy (Mcal)	24	24
Crude Protein (g)	984	800
Calcium (g)	30	34
Phosphorus (g)	21	19
Magnesium (g)	11.3	9.8
Potassium (g)	31.2	32.2
Selenium (mg)	2.0	2.0
Vitamin A (IUx1000)	22	20
Vitamin E (IU)	800	800

The above intakes are going to be a function of training intensity, stage of training (maintenance of training level takes less work than getting to the peak), individual response to training and feed efficiency differences between horses. Additionally, if more than 50% of the DE requirements are met by forage then grain intake can be reduced. As for light work, a fully fortified pelleted or textured feed (12 -14% protein) or a supplement pellet plus straight grain fed at levels which meet energy requirements will insure that other nutrient needs are met.

Unlike horses doing light work, there is a considerable risk for horses at moderate work intensities to develop muscle problems. It is critical for horses to be ridden every day, to be worked within their metabolic means, and to have feed intakes reduced on light work days if tying up and other types of muscle pathology are to be prevented. For horses at risk, I have found that maximizing the role of forage in the diet, adding fat and beet pulp to the diet to replace some of the starch calories and insuring adequate electrolyte intake all help to prevent muscle problems from occurring or help in the maintenance of horses that have tied up. Oil or fat intakes of 12 oz/day can easily be tolerated by these horses and concentrate rations with as high as 25% beet pulp are excellent for horses at higher intensities of work. It is also well to remember that a strictly aerobic, stress-free warm-up period is effective in helping to promote normal metabolism (besides being good for the horse's brain). If more people spent more time with these horses at the walk and long trot a great many physical and mental disasters could be averted. Even though people would like there to be a real difference in the way one feeds reiners, cutters, snaffle bit horses and roping horses, they really, from a nutritional point of view, are pretty much the same horses.

Horses at high work intensity

The western performance horse doing intense work is the exception rather than the rule. When we think about horses doing heavy work, we generally think about the high goal polo pony, the race horse or the upper level 3-Day Event horse rather than western horses. On the other hand some really professional western performance horses may fit into this category! Some of the horses that may want to be fed like a race horse include barrel racing horses headed for a futurity, upper level cutting horses and reining futurity prospects in the final stages of preparation for shows. Some might even argue that some really top team roping horses get enough riding to warrant being in this nutritional classification. Table 4 lists the nutrient requirements of the horse at high work intensities.

In most instances it is fairly impractical to think that 50% of a hard working horse's energy requirements can be met by forages. For example, if one met 50% of the 34 Mcal DE requirement of the hard working horse with timothy hay, this would necessitate a hay intake of roughly 27 lbs of this hay per day or 2.7% of a 1000 lb horse's body weight per day. This is obviously reaching the horse's capacity to

consume dry matter. For higher quality hays the problem is not quite so severe and indeed some

TABLE 4. DAILY REQUIREMENTS FOR SELECTED NUTRIENTS FOR WESTERN HORSES DOING INTENSE WORK (1100 LBS MATURE WEIGHT).

Nutrient	*Required*	*Nutrient*	*Required*
Dig. Energy (Mcal)	33	Potassium (g)	49.9
Crude Protein (g)	1200	Selenium (mg)	2.5
Calcium (g)	40	Vit A (IUx1000)	22
Phosphorus (g)	29	Vit E (IU)	1000
Magnesium (g)	15.1	Salt (g)	90

high goal polo ponies play the Argentine Open off of really good quality pasture. However the reality works better than the theory and it is commonplace for horses at intense or heavy work loads to be fed free choice hay and limit feed grain. Research has indicated that when this is done the horse will voluntarily consume about 15 lbs of hay. Making the assumption that this hay is worth about .9 Mcal per lb the DE consumed from hay would be 13.5 Mcal per day leaving a deficit of roughly 20 Mcal per day that must be derived from the grain mix. Using our figure of 1.4 Mcal per lb for a typical grain mix this would necessitate that the horse consume from 14 - 15 lbs of grain per day. Interestingly, these numbers are nearly identical to the numbers found to be fed to race horses in hard training at the race track. We must forever be cognizant of the fact that these are average numbers and there is an extreme degree of variation in actual intake of feed between individuals. It is also important to identify methods of decreasing the starch load of horses consuming a great deal of feed. Probably the most effective way of accomplishing this is by using a fat-added feed or by top-dressing with fat at the time of feeding. Modern performance rations may contain fat at 5 - 10 % of the grain mix. All of the answers are not in terms of the net effect of feeding fat to the horse but it is apparent that the horse readily utilizes fairly large amounts of animal fat or vegetable oil. Another effective and fairly popular method of replacing starch calories is the use of sugarbeet pulp. Beet pulp is a readily fermentable fiber source that has roughly the same DE value as oats but unlike oats the energy derived from beet pulp is derived from fermenting the fiber to produce VFAs which when absorbed in the cecum contribute to the energy economy of the horse. Another viable source of readily fermentable fiber that can effectively be used in the diets of performance horses is soy hulls. Practical diets containing as much as 30% soy hulls can be made and are readily consumed by the horse. This source of fiber necessitates a pelleted feed and may therefore reduce the number of consumers willing to feed it. The real key to meeting these horses' energy requirements in a safe and efficacious manner is feeding management: small meals, frequently fed, with reliance upon a variety of energy precursors.

Supplements for the working horse

If the basal ration is properly formulated and fortified with adequate macro and micro minerals as well as with fat and water soluble vitamins there are few supplements that really should be necessary. In most instances the only plausible arguments that can be made for supplements are for a good electrolyte, a biotin supplement and an extra vitamin E and selenium supplement. In extraordinary cases when horses have been stressed one may also consider a probiotic and perhaps a B-complex vitamin supplement. Electrolytes are discussed in other papers in this proceedings but it is worth mention here as well. More times than not, simply providing free-choice salt is all of the electrolyte supplementation that is necessary. In those instances when another electrolyte supplement is considered, an electrolyte should be chosen that effectively replaces electrolytes actually lost in sweat. Biotin supplements, if used, should provide at least 15 mg/day of biotin, 3 grams per day of methionine and 200 mg of zinc. There is some indication that chelated zinc sources may be most effective in this application. When using a supplemental source of vitamin E and selenium one should try to find a supplement that provides 1000 mg of vitamin E and 2 mg of selenium. Extra B-complex vitamins may be warranted due to the unusually high levels of starch intake associated with feeding the high performance horse and the role that these vitamins play in starch metabolism. There appears to be some validity to feeding supplemental thiamine to horses that appear to have particularly nervous dispositions. When this is done I generally recommend thiamine intakes of 1000 mg/day. Additionally, even with the most meticulous feeding management routine, cecal function may be somewhat compromised due to large pH shifts associated with undigested starch entering the cecum. Maintenance of cecal homeostasis is critical and cecal acidosis may be the second largest cause of anorexia in the performance horse, second only to gastric ulcers. Due to the positive effects of yeast-culture on cecal metabolism it has been our tendency to include yeast culture in the diets of performance horses.

In summary, meeting the energy needs of performance horses tends to be the most important aspect of feeding for performance. When a well formulated and PROPERLY fortified feed is fed in adequate quantities to meet energy demands, nearly by definition, other nutrient requirements are met as well. There is no magical formula that legally makes horses run faster and jump higher. The real key to feeding to maximize performance is attention to detail, reliance on high quality forage in the feeding program and adjustment of feed intake to meet individual needs.


Kentucky
Equine
Research®