

Nutritional Management of Equine Medical Conditions

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Introduction

Feeding a healthy horse is a relatively straight-forward endeavor: maximize high quality forages, supply NRC daily recommended levels of protein, vitamins, and minerals for that class of horse, and feed concentrates according to energetic requirements. Unfortunately, feeding protocols for horses with specific medical conditions are not so simple or well-defined. This is due to the fact that the majority of published research in equine nutrition focuses on the requirements of the “healthy” horse, but scientific research related to feeding the “sick” horse is limited. The research and information that is available, combined with practical field experience, gives equine nutritionists a solid basis for outlining feeding protocols that will both theoretically and functionally support horses suffering from a particular medical condition. The intent of this paper is not to provide an in-depth review or research outline, but rather serve as a practical reference for practitioners looking for concise feeding recommendations to pass along to their clients. More in-depth reviews or chapters on clinical equine nutrition are available for reference (Reed et al. 2010, Geor 2009, Lewis 1995).

Gastrointestinal Disorders

Gastric Ulcers. When feeding horses with suspected or diagnosed gastric ulcers, simple changes in the diet and feeding management practices can produce distinct improvement when paired with pharmacologic treatment. Maximizing pasture turnout to allow grazing is one of the most important management strategies for controlling gastric ulcers in horses (Reese and Andrews 2009). If a horse is stalled for any period of time, continuous access to forage should be allowed. Inclusion of alfalfa hay in the diet, preferably provided at regular 5 – 6 hour intervals, is recommended as it may have a protective buffering effect in the stomach (Nadeau 2000). Feeding a fat- and fiber-added and lower soluble carbohydrate concentrate is recommended if additional calories are needed, and specific Purina feeds that fit this criteria are Ultium (12.4% fat, 18.5% fiber, 19% WSC+starch, 1900 Cal/lb), Strategy Healthy Edge (8% fat, 18% fiber, 18% WSC+starch, 1300 Cal/lb), and Wellsolve L/S (5.5% fat, 23% fiber, 11% WSC+starch, 1200 Cal/lb). Increasing the frequency (3 to 4 meals per day) and decreasing the size of concentrate meals is recommended, especially if the horse is consuming a large amount on a daily basis. If a forage-only diet meets caloric requirements, Nature’s Essentials Enrich 32 and 12 ration balancer supplements will provide the protein, vitamin, and minerals lacking in a forage-only diet.

There are currently many supplements on the market claiming to prevent, reduce or eliminate gastric ulcers, but most of these products have not been tested and little scientific evidence exists regarding their efficacy. Many supplements contain varying concentrations of calcium carbonate, which is the primary component of human antacid preparations. These preparations have been shown to temporarily increase gastric juice pH for 2 hours following administration (Garcia et al.

2005, Reese and Andrews 2009). Because of this short duration effect, frequent feedings would be necessary to elicit any long-term effect or to prevent gastric ulcers. In contrast, hypertonic electrolyte pastes or solutions, which are commonly administered to endurance horses, have been shown to exacerbate the severity of gastric ulcers upon repeated administration (Holbrook et al. 2005). In horses with gastric ulcers, these electrolyte products should be used with caution and only administered following exercise with a small meal to minimize damage to gastric mucosa.

Small Intestine Malabsorption and Chronic Inflammatory Bowel Disease. Chronic wasting and poor body condition, despite adequate provision of nutrients and calories in the diet, may be attributed to an impairment of the small intestine's ability to digest and/or absorb carbohydrates, fats, vitamins, minerals, or to a lesser extent water and electrolytes. Intestinal function tests, such as an oral glucose tolerance test or D-xylose absorption test, will help to assess the carbohydrate absorptive capacity of the small intestine. Up to 50% of horses with intestinal dysfunction were also found to suffer from some form of inflammatory bowel disease (IBD) based on rectal biopsy (Lindberg et al. 1996). The role of food allergy in IBD is still unclear, and the true incidence of adverse food reactions in the horse is not known but assumed to be rare (Littlewood 2002). If suspected, a food elimination test followed by a re-introduction challenge is the only accurate way to identify sensitivity to a particular feed component. Feeding recommendations for horses with either malabsorption or IBD are similar, but some experimentation may be necessary to find the optimal diet for an individual horse. Most importantly, small meals (no larger than 2 – 4 pounds) of easily digestible feed should be offered on a frequent basis. Higher fiber feedstuffs that promote large intestinal fermentation and fat-added feeds that are more calorically dense are recommended. Only high quality forages should be fed, and straight alfalfa or alfalfa-mix hays are preferred due to their higher energy density. Alfalfa cubes, alfalfa pellets, or non-molassed beet-pulp are other good fiber sources that may be utilized. Providing ample access to pasture is also a good management strategy. Concentrates should be fed according to the horse's caloric requirements, which will typically be elevated. Purina Ultium (higher calorie) and Strategy Healthy Edge (lower calorie) work well with these horses. In more severe cases, long-stemmed-forage may not be well-tolerated; therefore a complete feed will produce the best results. The recommended Purina complete feed in this case is Equine Senior. If a horse needs additional calories, the Amplify fat supplement works well to induce weight gain.

Chronic Diarrhea/Colitis. When dealing with a horse suffering from chronic diarrhea, it goes without saying that infectious diseases, parasites, toxicologic diseases, hindgut acidosis (carbohydrate overload; too much grain and not enough forage), sand enteropathy, and any other potential causes should be first ruled out and treated if warranted. The objective for feeding these horses should be to reduce the mechanical and physiologic demand on the colon. This can best be accomplished by reducing or eliminating long-stemmed forage and feeding a complete feed such as Equine Senior. Frequent meals (4 – 6 per day) are recommended. High quality grass hay and pasture are acceptable, but alfalfa should be used with caution as it may have a laxative effect in some horses. If a horse tolerates high quality grass hay, high fiber and low non-structural carbohydrate concentrate feeds should be utilized, such as Purina Wellsolve L/S, Strategy Healthy Edge, or Ultium. For horses with sand overload, free choice access to grass hay has been shown to stimulate the passage of sand through the gut (Lieb and Weise 1999). Prevention is essential with sand ingestion and hay or concentrates should never be fed directly off the ground in susceptible horses. Psyllium mucilloid supplements are often used as a

preventative for sand accumulation, but there is conflicting data to support this recommendation. One study indicated an advantage to combining 0.5 g psyllium/kg bodyweight with mineral oil fed twice daily for eliminating sand from the hindgut (Hotwagner and Iben 2008). However, another study failed to show any benefit of supplementing 1 g psyllium/kg bodyweight/day for sand evacuation (Hammock et al. 1998). The majority of commercially available equine-specific psyllium supplements provide approximately 0.2 g psyllium/kg bodyweight/day (or less), and they can be fairly expensive (up to \$3.75/day). Therefore, usage as a sand preventative is not recommended but is considered safe if an owner desires to utilize it for peace of mind. On the other hand, psyllium (5 tablespoons every 12 – 24 hours) increases the production of short chain fatty acids (i.e. butyrate, a source of energy for colonocytes) and is thought to be clinically useful for promoting mucosal healing in cases of colitis (Jones 2010).

Probiotic supplements are often marketed toward horses with diarrhea and gastrointestinal diseases, based on positive results observed in other species. However, evidence in the horse is lacking and the quality of many commercially available probiotic preparations is questionable at best. Out of 13 probiotic products evaluated in one study, only 2 contained what was stated on the label and the rest contained few, if any, viable organisms along with some additional pathogenic organisms (Weese 2002). Even for those commercial probiotic supplements that do meet label claims, efficacy is highly questionable and they may even be detrimental. For example, the administration of *Lactobacillus pentosus* WE7 for 7 days to neonatal foals resulted in more days with diarrhea and incidence of colic compared to placebo treatment (Weese and Rousseau 2005). There is ample anecdotal evidence available suggesting a potential role for probiotic treatment in certain cases, but more study is needed and stricter quality control measures for commercial supplements must be implemented before sound recommendations can be made.

Chronic Colic. While “chronic colic” is not a specific diagnosis or disease, managing a horse which suffers from regular bouts of abdominal pain necessitating medical intervention can be frustrating for an owner. A wide variety of conditions may result in frequent bouts of colic, and certainly the horse should be screened for such conditions and treated appropriately. Feeding recommendations for this type of horse are fairly straightforward, and feeding management practices are just as important as the type of feed offered. Stabled horses with reduced access to grazing are 3 times more likely to suffer from colic, and maximizing pasture access should be initiated if at all possible (Durham 2009). Similar to horses with malabsorption problems, only highly digestible feeds should be utilized and small, frequent meals should be offered throughout the day. Providing a minimum of 1.5% of a horse’s bodyweight in forage per day is advisable, and free choice access is preferable to intermittent access. In addition to grass pasture, good forage options include high quality alfalfa or grass-alfalfa mix hay, soaked alfalfa cubes, and beet pulp. Use of specialized hay nets or hay bags that reduce the rate of intake will help to mimic natural grazing behavior while stalled. Sudden changes in forage source, such as when switching to a new batch of hay, should be avoided. The “old” hay should be slowly replaced with the “new” hay over a course of 5 – 7 days. Having hay tested at a forage testing lab such as Equi-Analytical (Ithaca, NY; www.equi-analytical.com) is a good idea to insure that the forage is of acceptable quality, as consumption of mature hay can easily lead to colic in sensitive horses. The relative feed value (RFV) gives an estimate of the maturity of the plant when it was harvested, neutral detergent fiber (NDF) is a measure of all cell wall components including

lignin (indigestible fiber), cellulose, and hemicellulose, and acid detergent fiber (ADF) is a measure of lignin and cellulose. Feeding hay with an RFV of ≥ 87 , NDF of ≤ 60 (as fed basis), and ADF of ≤ 42 (as fed basis) is recommended. If a horse has a history of enteroliths, alfalfa hay should be avoided.

In some cases, replacing all or the majority of long-stemmed hay with a complete feed will reduce the frequency of colic bouts. Equine Senior is an easily digestible complete feed that works well in these cases. Omolene 400 is another option if more calorically dense complete feed is needed. Again, small frequent meals should be offered. If high quality hay is well-tolerated, concentrate feeds offered should be higher in digestible fiber with moderate soluble carbohydrate content. Depending on the horse's caloric needs, Purina Ultium, Omolene 500, Strategy Healthy Edge, or Wellsolve L/S would be appropriate. In addition, supplementing 1 – 2 Tbsp. plain white/day salt may encourage water intake, especially in the colder months when some horses drink significantly less water.

Intestinal Resection. For horses with small intestinal resection, the maintenance diet should consist primarily of higher fiber, easily digestible feedstuffs which are fermented in the hindgut. The duodenum and jejunum are the primary sites for starch, vitamin, and mineral absorption (except phosphorus, which is absorbed in the colon), while the ileum is the primary site for fat and fat-soluble vitamin absorption. Horses with 50% small intestine resection have been successfully maintained on diets containing fermentable fibers and fat from oil and rice bran sources (Geor 2000). Feeds such as Purina Ultium, Strategy Healthy Edge, and Wellsolve L/S will work well for these horses, and including alfalfa hay into the forage program is recommended. Horses with 70% distal small intestine resection have been successfully maintained on frequent small feedings of complete feeds (Lewis 1995). Equine Senior or Omolene 400 is appropriate for these cases. If $>50\%$ of the small intestine has been removed, additional vitamin and mineral supplementation may be necessary, and supplementing with 1 lb. of Enrich 12 or 32 per day may be of benefit in these cases.

In cases of colon resection, more emphasis should be placed on maximizing small intestinal digestion while still providing some easily digestible fiber to maintain hindgut health and integrity. For the first 30 days following surgery, a low fiber, high protein and phosphorus diet should be provided. Concentrates formulated for growing horses, such as Omolene 200 or 300 paired with high quality alfalfa or alfalfa-mix hay, work well during this time. For horses with extensive colon resections ($>90\%$), this diet should be continued and B-complex and K vitamin supplementation may be required due to a compromised ability to produce these vitamins (Lewis 1995). However, digestive ability may return to normal in horses with resection of only the left colon or cecum. These horses may be able to eventually return to a normal diet, and perhaps even a forage-based ration.

Obesity, Metabolic Syndrome, Laminitis, and PPID

Although obesity, metabolic syndrome, pituitary pars intermedia dysfunction (PPID), and laminitis are unique medical conditions, they are somewhat interrelated and share commonalities when it comes to feeding recommendations. It is recognized that obesity is a major problem in today's horse population, and it can lead to many health problems including insulin resistance or

laminitis if not controlled. However, not all obese horses are insulin resistant and not all insulin resistant horses are obese (Frank 2010). If a horse is obese (≥ 7 on the Henneke body condition score scale), weight loss should be induced by restricting the total number of calories offered to the horse. If a horse is both obese and insulin resistant, reducing bodyweight is sometimes all that is necessary to bring the horse back to normal glucose/insulin homeostasis (Gordon et al. 2009). Placing a horse on a ration balancer supplement and restricted forage program works well. Alternatively, the weight loss feed product Wellsolve W/C can be utilized for owners that feel it necessary to feed the horse some concentrate. While on a weight loss program, it is imperative that pasture intake be limited or eliminated. This can be accomplished through short (< 1 hour) turnout periods, utilization of a dry lot, confinement using electric fencing or round pen in a larger pasture, or the use of a grazing muzzle. Moderate quality grass hay should be fed at a rate of no more than 1.5 – 2% of the horse's current bodyweight per day. A protein/vitamin/mineral supplement (ration balancer) such as Enrich 32 will provide the nutrients missing in a forage-only diet without the addition of unnecessary calories. Wellsolve W/C is a low-calorie extruded pellet that can be used to give the horse more "chew time" while providing essential protein, vitamins and minerals. This product may be useful for horses in group feeding situations or for those owners that prefer to feed more volume. Initiating an exercise program that includes 30 minutes of forced physical activity 6 times per week is also recommended for obese horses.

For horses that are diagnosed as insulin resistant, suffer from PPID with insulin resistance, or that have a history of chronic laminitis, sugars, starches, and pasture should be limited in the ration. Commercial feed products should have the actual starch and sugar level separately guaranteed on the tag, and hays should be analyzed for soluble carbohydrates at a forage testing lab. Keeping the total ration under 12% soluble carbohydrate (WSC+starch) is recommended. Claims of "low starch" or "low carb" in commercial products without tag guarantees should not be relied upon for sensitive horses, as these claims are not currently regulated by AAFCO and manufactures are not given any guidelines as to what level is considered "low". Wellsolve L/S is a feed specifically formulated for insulin resistant horses that is backed by published data (Gordon et al. 2007). Sugar and starch is guaranteed directly on the tag at 11%, and it is fortified with highly digestible fibers, natural source vitamin E, therapeutic levels of biotin, and essential fatty and amino acids. Dividing the concentrate portion of the ration into 3 or more meals per day will help prevent spikes in insulin, as will providing access to low soluble carbohydrate forage on a continuous basis. Soaking hay in cold water for 60 minutes or warm water for 30 minutes may reduce starch and sugar content by 20-30%.

Insulin resistant horses that need to gain weight can be fed increased quantities of Wellsolve L/S divided into multiple small meals or can be supplemented with up to 3 – 4 cups of soybean oil per day (depending on the size of the horse; introduce slowly). Alfalfa hay can sometimes be lower in soluble carbohydrates, and may be used to increase caloric intake as well.

Special considerations regarding the fructan content of forages must be made for horses with a history of and/or at risk for laminitis. Fructans are the primary form of stored carbohydrate in cool season grasses (i.e. orchardgrass, timothy), but they are not present in warm season grasses (i.e. Coastal bermudagrass, bahiagrass) and legumes. Fructan content in cool-season pasture varies over the course of a 24-hour period and with changing seasons and weather conditions. In general, fructan levels begin to rise during the morning hours, peak in the afternoon, and are

lowest overnight and in the early morning hours (Longland and Byrd 2006). Drought conditions can cause fructan accumulation, and seasonal influences result in the highest fructan concentration in spring grass, lowest levels during the mid-growing season, and moderate levels in the fall (Longland and Byrd 2006). Extra caution should be taken during these times, and grazing should be restricted to times when fructan content is lowest (late evening through early morning). In horses with severe and recurrent laminitis, allowing pasture access may never be an option. Mildly affected horses may be able to return to grazing under careful observation and if the above guidelines are adhered to.

Liver Disease

There are numerous causes of hepatic insufficiency and liver disease, but feeding recommendations are consistent for the vast majority of them. The goals should be to 1) meet dietary energy needs, 2) supply a high level of soluble carbohydrates to reduce gluconeogenic strain on the liver, 3) limit fat and salt, 4) meet, but not exceed, protein requirements to help decrease problems with converting ammonia to urea, and 5) feed protein sources containing branched chain amino acids (BCAA; leucine, isoleucine, and valine). Horses with liver disease can't metabolize aromatic amino acids (AAA; tyrosine, phenylalanine, and tryptophan), which can accumulate and eventually enter into the cerebrospinal fluid and exacerbate hepatic encephalopathy. BCAA, on the other hand, are readily metabolized by muscle and adipose tissue. Multiple small meals are preferred, and free choice access to good quality grass hay and/or pasture is recommended. If a horse can tolerate the protein (plasma ammonia may need to be monitored), alfalfa may be incorporated into the diet to stimulate appetite or facilitate weight gain and is a good source of BCAA (Lewis 1995, Barton 2010). Corn, bran, and milo have a high BCAA/AAA, and the incorporation of cracked corn into the diet may be beneficial due to both increased levels of BCAA and dietary starch. Depending on the current body condition of the horse and caloric needs, there are a few concentrate feeding programs that would be appropriate. For horses that are at a healthy bodyweight or that need to gain weight, Omolene 100 is a low protein, low fat sweet feed that meets the criteria for feeding horses with liver dysfunction. Omolene 100 should be fed according to caloric needs, and the daily ration should ideally be divided into 3 or more meals per day. Wellsolve L/S is a lower-calorie concentrate feed that has been used with success as well, especially in cases where soluble carbohydrates need to be limited due to concurrent insulin resistance. For horses that are overweight, Enrich 12 (fed at a rate of 1 pound per 1000 lbs bodyweight) supplemented with a small amount of cracked corn (fed at a rate of 1-2 lbs per 1000 lbs bodyweight) will supply soluble carbohydrates and BCAA but a lower level calories. The corn may or may not be necessary in overweight horses, depending on the severity of the case. No salt should be added to the diet or provided for free-choice consumption, especially if ventral or distal limb edema occurs (Lewis 1995). Horses with hepatic failure also may benefit from daily oral ascorbic acid, since the liver is the site of vitamin C synthesis.

Renal Disease

When managing horses with chronic renal failure, the goals should be to provide access to plenty of fresh clean water to maximize intake, encourage appetite with palatable feeds to prevent weight loss, and feed a ration that meets but not exceeds protein, calcium, and phosphorus

requirements (Lewis 1995). Legumes, soybeans, wheat bran and calcium/phosphorus containing supplements should be avoided. Molasses may be added to the ration to increase palatability if needed. An appropriate ration for a horse with chronic renal failure can generally be accomplished with good quality grass forages and a low protein ration balancer (Enrich 12) or a grain-based concentrate (Omolene 100) if additional calories are needed. Fat supplementation may be appropriate if warranted but must be approached with caution in horses with hyperlipidemia or hypercholesterolemia (Schott 2010). Hypoproteinemia can also develop in some horses with renal failure, therefore protein supplementation may be necessary (Geor 2000). Soybean meal works well as a protein supplement in these cases, as it contains less calcium per unit of protein than other protein supplements. If serum bicarbonate concentration is consistently less than 20mEq/L, sodium bicarbonate (50 – 150 g/d) may be warranted unless ventral edema becomes a problem (Schott 2010).

Respiratory Disease

Horses suffering from inflammatory airway disease (IAD), recurrent airway obstruction (heaves), or summer pasture-associated heaves (primarily a condition observed in the Southeast) are sensitive to airborne allergens present in hay, bedding or summer pasture. The dietary goal is to minimize exposure to the triggering allergens. Many horses with IAD or heaves do well living outside when removed from the dusty, poor ventilation of barns. On the other hand, horses with summer pasture-associated heaves must be kept off pasture to minimize exposure. For horses with all conditions, only dust-free feeds and bedding should be used. Shredded paper or pelleted bedding may be preferable to wood shavings or straw, and sweeping and blowing barn aisles while affected horses are in the barn should be avoided. Some horses suffering from respiratory disease are intolerant to any type of hay and do well on a complete pelleted feed such as Equine Senior, Omolene 400, or Horse Chow 100 or 200. Other horses may be able to tolerate hay or hay cubes that are soaked thoroughly before being offered. Decreased ascorbic acid (Vitamin C) in the epithelial lining fluid of horses suffering from heaves has been reported (Deaton et al. 2004). Dietary Vitamin C supplementation has been hypothesized to decrease oxidative stress and improve pulmonary function, but this has yet to be proven in the horse.

Musculoskeletal Disorders

Recurrent Exercise Rhabdomyolysis/PSSM. Although the causes of recurrent exercise rhabdomyolysis (RER) and polysaccharide storage myopathy (PSSM) are very different, and there are several variants of each condition, dietary management strategies are very similar. The primary goals are to reduce soluble carbohydrate in the ration, supply additional energy with fat, and ensure adequate vitamin E intake. RER is commonly seen in Thoroughbred racehorses in training, while PSSM is more commonly seen in Quarter Horse, warmblood, and draft horse breeds. The following feeding recommendations are based upon the guidelines of Dr. Stephanie Valberg, who has been leading research efforts on muscle disorders at the University of Minnesota for many years. A minimum of 1.5% of a horse's bodyweight in forage with low soluble carbohydrate ($\leq 12\%$ WSC+starch) content should be provided. The concentrate that is fed should preferably supply no more than 15% of total digestible energy as non-structural carbohydrate (WSC+starch). In addition, 10 – 20% of the total daily energy should come from fat (depending on caloric requirements). Depending on the size and total caloric requirement of

the horse, Purina feeds that can be used to meet these criteria are Ultium and Strategy Healthy Edge (best for PSSM horses and racehorses severely affected with RER), Omolene 500 and Race Ready (best for most racehorses with moderate RER), Enrich 32 and Amplify (best for easy keeper PSSM horses). Wellsolve L/S and straight oil may also be an option for especially sensitive PSSM horses. Implementation of a regular exercise program is also important in the management of horses with both RER and PSSM, and efforts to reduce environmental stress may benefit horses with RER (McKenzie and Firshman 2009). Supplemental Vitamin E, at a rate of 1000 – 2000 IU per day, may also be beneficial for horses with both conditions. Care should be taken to ensure that electrolyte requirements are being met according to sweat losses based on exercise duration and ambient temperature. In addition, concentrate feeding should be avoided in the 2 – 3 hours preceding exercise, as dietary carbohydrates may inhibit lipid oxidation in the muscle cell and exacerbate symptoms (McKenzie and Firshman 2009).

HYPP. Dietary treatment of hyperkalemic periodic paralysis (HYPP) is focused on preventing an increase in serum potassium by one or a combination of three methods: 1) limiting dietary potassium intake, 2) promoting the uptake of potassium into cells via the action of insulin, and 3) eliminating excess extracellular potassium from the body via the urine with a diuretic such as acetazolamide (NRC 2007). The total concentration of potassium in the diet should be $\leq 1.1\%$. The single largest source of potassium in a horse's diet is forage; therefore it should be addressed first. Pasture works well for HYPP horses due to the high water content of the grass which makes consuming high levels of potassium in a short time period unlikely. Only grass hays should be utilized, and they should ideally be analyzed for potassium level (many varieties contain $>3\%$ potassium). Soaking hay for 30 minutes in hot water or for 60 minutes in cold water reduces the potassium content by up to 55%. Feeding grains benefit HYPP horses not only because they are low in potassium, but also by stimulating insulin release that may facilitate potassium uptake by muscle cells (NRC 2007). Dividing the daily ration into several evenly spaced meals with no more than 33 g potassium per meal will help to limit the effects of large amounts of potassium reaching the blood at once (Reynolds et al. 1998). There is a popular misconception that molasses should not be fed to horse with HYPP, but this is not necessarily the case. While it is true that molasses contains $\sim 4\%$ potassium, it can be a useful ingredient to enhance palatability and provide energy from carbohydrates if included as a small portion of the diet. Sweet feed formulations typically only contain 5 – 10% molasses, and the total contribution of potassium from molasses in a 4 lb meal of sweet feed would be relatively minor (3.6 – 7.3 g K). Purina concentrate feeds appropriate for horses with HYPP are Omolene 100 (0.85% K), Omolene 200 (1.0% K), Omolene 500 (1.1% K), and the calorie supplement Athlete (0.7% K). Depending on the potassium content of the forage and sensitivity of the horse, other feeds such as Race Ready (1.2% K), Strategy (1.25% K) or Ultium (1.25% K) may be utilized if care is taken to limit the potassium in a single meal to less than 33 g. When low potassium hay is hard to find, utilizing complete feeds that have guaranteed potassium levels may be a more convenient option for owners. Equine Senior (1.6% K), Omolene 400 (1.35% K), Horse Chow 100 (1.5% K), and Horse Chow 200 (1.4% K) are Purina complete feed options that may be utilized, and should be provided in small frequent meals.

Developmental Orthopedic Disease

A variety of growth conditions fall into the category of developmental orthopedic disease (DOD), and a complete discussion of all factors involved is beyond the scope of this paper. More comprehensive reviews on the interaction of genetics, management, and nutrition on the incidence DOD are available (Raub 2010, NRC 2007, Lewis 1995). When faced with treating a growing horse with phytitis, OCD, or another form of DOD, the basic feeding recommendations are the same. It is important for the practitioner to recognize that nutrition plays a secondary role to genetics unless gross deficiencies, excesses, or imbalances of nutrients are present in the diet (particularly of energy and minerals, but not protein) (Lewis 1995). The primary nutritional goal should be to reduce dietary energy intake while meeting (but not exceeding) protein, vitamin, and mineral requirements. This cannot be accomplished simply by placing the horse on a forage-only diet, as forages are deficient in several key trace minerals and amino acids necessary for growth and development. Depriving a horse of the nutrients necessary for optimal bone and soft tissue development would be counterproductive and may lead to exacerbation of problems in the future. If a foal is still nursing, weaning early should be considered if the foal is especially large. This will allow for the ability to better control calorie intake if free-choice milk consumption is prevented. Grass hay should be provided at a rate of 1.5 – 2% of the horse's bodyweight (or a corresponding level supplied via pasture). All grain concentrates should be discontinued and replaced with a high protein ration balancer supplement such as Enrich 32 fed according to bag directions (typically between 2 – 3 lbs/day). Alternately, the complete feed Equine Junior may be a better option if hay quality is poor or intake is difficult to control. A reduced rate of 0.75% of bag recommendation should be offered in frequent small meals throughout the day, along with a minimal amount of grass hay for "chew factor". These reduced calorie feeding programs will help to slow down the rapid growth rate of the foal while providing essential nutrients necessary for musculoskeletal integrity. The program should be followed until DOD symptoms have subsided. At this time, other feeds formulated specifically for growing horses may be utilized according to the horse's caloric needs. In addition to Enrich 32 and Equine Junior, Purina feeds formulated for growing horses include Strategy, Omolene 200, Omolene 300, and Ultium Growth. Maintaining a steady growth rate is important for the prevention of DOD, and fluctuations in forage energy content throughout the growing season must be compensated for by concentrate level adjustment. However, care should be taken to provide no less than the minimum recommended feeding rate to ensure protein, vitamin, and mineral requirements are being met. If a young horse continues to grow rapidly or if the forage is especially energy-dense, then they may be successfully maintained on Enrich 32.

Conclusion

There is still much to be discovered about the nutrient requirements of horses with specific medical conditions. Although scientific research to support recommendations for feeding sick horses is limited, general guidelines are beginning to be established and field experience gives equine nutritionists a basis for making sound recommendations. Treating each ill horse individually, while utilizing common sense as it relates to nutrition and physiology can help many of these animals return to health. Future research will assist in further developing feeds and feeding guidelines for medical conditions, leading to the improved health and well-being of the horse.

For a customized nutritional recommendation for a specific case and/or a different medical condition, contact a Purina equine nutritionist through www.equinevetnutrition.com.

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