

Targeted diets can aid horses with liver disease

The liver has an amazing ability to regenerate, and nutritional management and medical therapy can help horses with liver disease regain or maintain adequate liver function.

By **BRYAN M. WALDRIDGE***

THE power of targeted equine nutrition programs is unquestionable.

Take, for instance, the feeding management practices that almost entirely relieve horses of the crippling signs associated with tying-up. By reducing starch intake and filling the caloric void with fat and fiber, many racehorses that are genetically predisposed to the disease have become successful athletes. This demonstrates the benefits of dietary manipulation.

Even more precisely targeted diets can benefit horses with certain compromised organs, such as horses with liver disease.

The liver accounts for approximately 1% of an adult horse's bodyweight. The organ lies almost entirely to the right of the median and is completely encased by the rib cage.

Of greatest significance anatomically is that a horse has no gall bladder. Because of this, bile is emptied directly from the liver into the duodenum. Horses are continuous grazers and constantly secrete bile (unlike humans and other animals with gall bladders that store and release bile when a meal is eaten).

The liver plays a crucial role in digestive processes and is chiefly involved in regulating nutrient distribution.

Nutrients absorbed in the gastrointestinal tract must pass through the liver via portal circulation. Serving as a clearinghouse of sorts, the liver assigns nutrients to essential roles. Some are metabolized for energy, some are transformed to other nutrient classes,

some are sent to peripheral tissues and others are stored by the liver for future use.

Another key function of the liver is maintaining consistent blood levels of nutrients between feedings.

While the liver is resistant to damage and can usually function with as little as two-thirds of its normal mass, whole-organ disease is possible and is life threatening when it occurs.

The Kentucky Livestock Disease Diagnostic Laboratory reported that hepatitis (inflammation with varying degrees of degeneration of the liver) was the most commonly diagnosed liver problem, with 6-10 cases per year.

Liver disease in mature horses is most often caused by exposure to toxic plants or feed toxins, infection or bile stones. Horses can occasionally develop serious liver disease after treatment with products made from horse blood, such as plasma or tetanus antitoxin.

Miniature horses, ponies and donkeys that stop eating, usually due to serious illness, can develop a potentially fatal accumulation of fat in the liver.

Blood work will usually reveal elevations in liver enzyme activity, i.e., gamma-glutamyl transferase, aspartate aminotransferase, lactate dehydrogenase and serum alkaline phosphatase. Measurement of serum bile acids is a useful blood test that evaluates liver function. Because the liver produces many of the proteins in blood, horses with liver disease may have low blood protein concentrations, especially albumin. Bilirubin can also be elevated, but another important and common cause of elevated bilirubin is anorexia.

Biopsy is the most definitive diagnostic test for horses suspected of having liver disease. Liver biopsies are generally safe, and veterinarians can perform them in standing horses with ultrasound guidance. Liver biopsy, bacterial culture and microscopic examination can usually determine the cause of liver disease, as well as the prognosis.

Clinical signs

Clinical signs of liver disease can be vague. Affected horses may have fever (temperature greater than 101.5°F [38.6°C]), jaundice, colic, lethargy or abnormal behavior. If its blood protein concentration is low, the horse may have edema of the legs and bottom of the chest and abdomen.

Some horses with hepatic disease will develop photosensitization, which makes them appear to have severe sunburn on the white areas of their bodies such as the face and leg markings.

Photosensitization occurs when the liver is unable to process chlorophyll (the green pigment in plants). An intermediate metabolite of this process called phylloerythrin reacts with ultraviolet light in sunlight to produce toxic free radicals that cause severe tissue damage.

Bile stones in horses can be incidental findings, but they occasionally cause disease if they block bile ducts.

Many toxins and metabolites normally produced by gut bacteria and removed by the liver can act on the nervous system if they circulate in the bloodstream, causing some horses with



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severely damaged livers to develop abnormal behavior — a manifestation called hepatoencephalopathy.

These metabolites are shaped like normal neurotransmitters and actually damage the nervous system (as is the case with ammonia), thus resulting in abnormal behavior. Affected horses may display apparent blindness, head-press or seizures or may become severely depressed or maniacal.

Some horses with liver disease might have bleeding tendencies because the liver produces many of the clotting factors.

Treatment

Specific treatment of liver disease depends on its cause. Infections can be treated with antibiotics and anti-inflammatory drugs such as corticosteroids or non-steroidal anti-inflammatory drugs.

Milk thistle supplements contain silymarin, which has antioxidant and other liver-protecting actions. There are several commercially available silymarin products, or milk thistle seed can be ground and fed with a concentrate. Colchicine and pentoxifylline are sometimes used to help prevent scar tissue or fibrosis of the liver.

Nutritional management

Nutritional management of liver disease is aimed at reducing dietary protein and the amount of ammonia and other gut-derived toxins that affect the nervous system.

Lower dietary protein will result in less

intestinal ammonia production. Dietary protein should be restricted as much as possible if the horse has signs of hepatoencephalopathy.

Mature adult horses in light work require only about 8% protein in their diet. This requirement can be met easily with good-quality grass hay or pasture. Feeding legumes such as alfalfa and clover, which are generally high in protein, should be avoided. Some clinicians recommend oat hay.

It is advisable to avoid feeding high-fat diets to horses with liver disease to reduce the possibility of fat deposition in the liver, which can further impair its function.

Horses with photosensitization can still graze or be turned out at night to avoid sunlight.

Dividing up the ration into several small meals will prevent large amounts of ammonia from leaving the gut and will reduce the load of ammonia that the liver must detoxify.

Feeding protein with an increased ratio of branched-chain amino acids to aromatic amino acids should improve clinical signs of hepatoencephalopathy.

Branched-chain amino acids (leucine, isoleucine and valine) can be used for energy and protein production. Aromatic amino acids (tyrosine, tryptophan and phenylalanine) are more likely to act as false neurotransmitters and produce neurologic signs.

There are commercially available branched-chain amino acid supplement pastes for horses that can be used to increase the proportion of these amino acids in the diet.

Beet pulp, corn, sorghum, wheat bran

and milo all have a favorable branched-chain:aromatic amino acid ratio, and it is recommended that they make up the majority of the diet for horses with liver disease.

Although its efficacy is questionable, vinegar can be added at a rate of two cups twice per day to acidify the gut and reduce ammonia production.

Antibiotics (metronidazole or neomycin) are sometimes administered to change the bacterial population of the gut and reduce gut ammonia production.

Folic acid, B vitamins and, especially, fat-soluble vitamins (A, D, E and K) should be supplemented to meet requirements. Fat-soluble vitamins should not be supplemented in excess because they can accumulate and have adverse effects. Vitamin K is important for blood clotting and will help reduce abnormal bleeding.

It is more important to keep horses eating to maintain body condition rather than making dietary adjustments that cause them to stop eating. If the horse will only eat legume forages, then feed the forages in moderation and divided into several small meals.

Hepatic disease can be a serious illness in horses and, at its worst, can be fatal. Biopsy of the liver is usually the only diagnostic test that can give a definite cause and prognosis.

Horses with severe clinical signs and profound changes in blood work and biopsy often have a poor prognosis for recovery. The liver has an amazing ability to regenerate, and nutritional management and medical therapy can help affected horses regain or maintain adequate liver function. ■