

Equine Welfare Series

RECOVERING THE MALNUTRITIONED HORSE

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Thin horses, or low body condition score, can be caused by many factors including age, disease and lack of adequate nutrition. Horse starvation within the United States is fairly common, most often caused mistakenly by the owner. Lack of fundamental equine nutrition knowledge, economic hardship, indecision or disagreements, and neglect, ultimately lead to a lack of adequate feed intake. In the wake of the ban on horse slaughter within the United States, there has been an overwhelming movement to “rescue” and rehabilitate unwanted horses that are often emaciated and in need of proper feeding and health care. As more time passes since this legislation, the number of starved horses may continue to rise. Additionally, even during times of adequate care and nutrition, disease and other impairments to body function can prevent a horse’s ability to maintain appropriate condition. Even with the best care and management, up to 20 percent of starved horses may die. Therefore, it is important to prevent these conditions whenever possible and provide adequate care for the starved horse.

Consideration of the starved horse’s overall health is important when developing a nutritional rehabilitation plan. Veterinary assessment of the health status of the horse is important prior to and during the reconditioning period as starvation can impact many body functions and pathways that are necessary for proper health. Nutritional

programs for the starved horse are often developed with consideration to the health status and current dental condition of the animal. Additionally, complications such as old age, nutrient malabsorption, senility and numerous diseases can prevent adequate reconditioning, so veterinary care is critical to the rehabilitation process.

Care and feeding of undernourished horses can be a challenging process due to the limited information available, differences between individual cases and various medical conditions that occur in malnourished horses. As starvation is of higher occurrence during winter and early spring months, management of the starved horse during these times is exceptionally challenging. Also, during times of drought there is a lack of readily available forages, which can lead to an increased need for high fibrous feedstuffs or complete feeds during the rehabilitation process. Returning emaciated horses to an appropriate body condition and healthy state requires intensive nutritional management to minimize the risk of refeeding syndrome and allow for safe weight gain. Refeeding syndrome may occur if feeds and forages are reintroduced too quickly and can result in heart, respiratory and kidney failure (for more information on refeeding syndrome, reference the Nutritional Background and Management Considerations section of this publication).

Determination and care of the starved horse requires guidance from an equine professional

including your county Extension agent, veterinarian, equine nutritionist or specialist. Body condition scoring can be a useful tool to determine a horse's nutritional status based on predictable patterns of fat deposition and removal. A detailed description of the uses and implementation of the body condition scoring system has been covered in UT Extension publication SP 782, "The Body Condition Scoring System." A horse can be considered starved and in need of special attention if:

1. The horse is adequately fed, has a body condition score (BCS, Table 1 or reference UT Extension SP 782 for more information) of less than 3 (image 1) and has no other associated health problems and/or

2. The horse has had nothing to eat for five or more days and/or

Image 1: Horse displaying a body condition score of 1.



Horses with a body condition score of 3 or less should be considered starved and in need of special attention. Based on the description of body condition described by Henneke and others, the horse depicted in this image would be classified as a 1.

3. The horse has lost more than 15 percent of its body weight in the previous 60 days or less and has no other associated health problems.

Initial Exam of the Starved Horse

A complete history of the horse will be helpful in determining the current status of the animal. Some of the concerns would include:

- What is the age of the horse?
- Has/does the horse had/have free access to clean water?
- What has the horse been fed? How much has the horse been fed/been eating? What feed and how much is currently available?
- Is the feed suitable for the age of the horse?
- Has the horse been worked, or just maintained in the pasture?
- Has the horse received any veterinary care? Deworming? Vaccination status? Hoof care? Dental care?
- Is there shelter available?
- Are there other horses in the pasture with the thin horse? Often, a thin or starved horse will be at the bottom of the pecking order.

Additionally, current overall health and body condition of the horse should be addressed. Some of the considerations would be:

- What is the heart rate?
 - Normal is 25-40 beats per minute for a mature horse.
- What is the body temperature?
 - Normal is 99- 101.5 degrees F for a mature horse.

*Table 1: Body Condition Scoring System for Horses.**

Score	Condition	Description
1	Poor	The horse is extremely emaciated. Ribs, tailhead, backbone (spinous and transverse process) and hipbones project prominently. Bone structure of the neck, withers and shoulder are easily noticeable. No fatty tissues can be felt.
2	Very Thin	The horse is emaciated. A slight fat covering over the vertebrae is present. Ribs, backbone (spinous and transverse process), hips and tailhead are prominent. Neck, shoulders and withers are discernable.
3	Thin	Fat built up about halfway on vertebrae (spinous process can still be felt). Tailhead evident, but individual vertebrae cannot be seen. Slight fat cover over ribs. Hip bones appear rounded but are still noticeable. Withers, shoulders and neck are emphasized.
4	Moderately Thin	Negative crease along back. Faint outline of ribs is noticeable. Fat can be felt around tailhead, prominence is dependent on conformation. Hip bones cannot be seen. Neck, withers and shoulders are not obviously thin.
5	Moderate	Back is level. Ribs are not easily seen but can be felt. Tailhead fat feels spongy. Hip bones are not noticeable. Withers, neck and shoulders are not obviously thin.
6	Moderately Fleshy	Slight crease down back may be present. Fat over ribs can be felt and tailhead fat feels soft. Fat beginning to be deposited on sides of withers, behind shoulders and along the neck.
7	Fleshy	May have crease down back. Individual ribs can be felt, but fat filling between ribs is noticeable. Tailhead fat is soft. Fat deposited along withers, behind shoulder and along the neck.
8	Fat	Crease down back. Difficult to feel ribs. Fat around tailhead is very soft. Areas along withers and behind shoulder are filled with fat. Thickening of neck is noticeable. Fat deposited along inner thigh.
9	Extremely Fat	Obvious crease down back. Patchy fat appearing over ribs. Fat bulging around tailhead, along neck, behind shoulder and along wither. Flank filled with fat. Inner thighs may rub together.

When assessing the tailhead, loin, ribs, behind the shoulder, and along the withers and neck, classify where each region falls in relationship to the score description. Select which score best represents the condition of the horse currently. Half scores can be assigned if the horse falls between classification descriptions. Reference UT Extension publication SP 782 for detailed information on using this system.

**Adapted from Henneke, et al., 1983.*

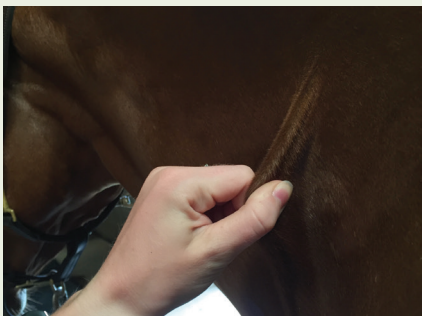
- What is the hydration status?
 - Pinch the skin over the shoulder or on the neck briefly, then release. It should return to normal in 2 seconds or less (image 2).
 - Determine capillary refill time as shown in image 3.
- What is the current body condition score?
 - Generally, the ideal body condition score ranges from 4 to 6. Horses with a body condition score of 3 or less are considered starved. Horses ranging in body condition score from 7 to 9 are considered overweight.
 - Body condition scores and their descriptions can be found in table 1.
 - Reference UT Extension publication SP 782 for more detailed information on using this system.

- Does the horse have abnormal tooth wear? Missing teeth?
- If this is a mare: Is she pregnant?

Veterinary Examination of the Starved Horse

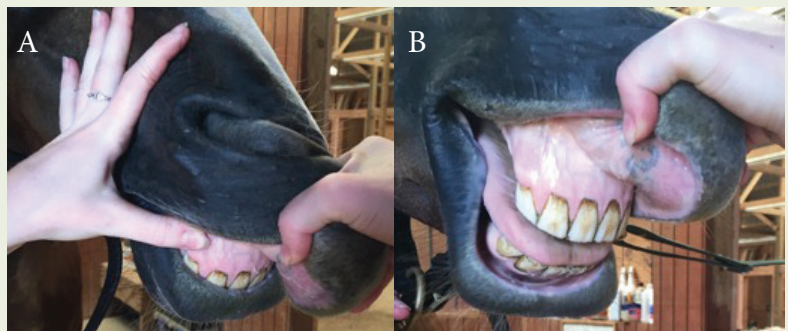
Rehabilitating a starved horse should be coordinated by a veterinarian to properly restore the health and well-being of the animal. The examination of the horse should include evaluation of the mucous membranes, such as the gums, and determination of capillary refill time (image 3). This is an excellent indicator of the hydration status of the horse. Also, the abdomen should be examined for presence of normal bowel sounds to ensure the horse has a functioning GI tract. It is recommended to obtain a fecal sample to conduct an internal parasites egg count as this may be a cause of the reduced body condition. An additional recommended testing procedure is a Coggins test. This is to test for Equine Infectious Anemia

Image 2: Skin tent test.



To determine a horse's hydration status using the skin tent test, pinch the skin over the shoulder or on the neck briefly, then release. The skin should return to normal within 2 seconds or less. If the skin takes longer than 2 seconds to return to normal, the horse is dehydrated. Contact a veterinarian to determine the level of dehydration and to develop a treatment plan.

Image 3: Capillary refill time.



To determine a horse's capillary refill time, lift the upper lip to reveal the gums (mucous membranes). Press firmly on the gums for at least 2 seconds, as shown in image 3A. Then, remove pressure on the gums and watch for the color to return to the area. If the gums return to a bright pink color, as shown in image 3B, in 2 seconds or less, the horse is hydrated. If it takes longer than 2 seconds for color to return to the gums, the horse is considered to be dehydrated. Check with a veterinarian for further examination to determine level of dehydration.

(EIA), which is a viral disease that affects the horse's liver and subsequently results in severe weight loss. Each horse is required to have a negative Coggins test for traveling, and the test is also important for general health. Since there is not a vaccine or a cure for this disease, it is very important that EIA be diagnosed. Additional blood tests can be performed to determine kidney, heart and liver function.

Feeding and Management of the Starved Horse

Nutritional Background and Management Considerations

Nutritional programs for starved horses should be coordinated with your county Extension agent, an equine nutritionist and/or a veterinarian. Methods to refeed the starved horse will largely depend on the horse's appetite, current body condition, prevalence of disease, and feeds available. Feeds should be reintroduced gradually and with consideration given to how much energy (caloric density) is in the feed and high starch grains. Refeeding syndrome occurs when large amounts of traditional high-starch grains are fed to starved horses in high amounts resulting in a surge of insulin release from the pancreas. Insulin acts on cells within the body to promote glucose movement from the bloodstream into the body's cells for use. The action of insulin in this manner is normal; however, in starved horses' the uptake of high concentrations of glucose forces large amounts of minerals out of the body's cells and into the bloodstream. High amounts of magnesium, phosphorous, potassium and other minerals can cause heart, kidney and liver failure, possibly leading to death within 3 to 10 days. Due to this condition and the nutritional needs of the starved horses, ration amounts should be fed and increased gradually to allow their body to reacclimate to a nutrient load.

Nutritional programs to refeed emaciated horses should be coordinated with health

rehabilitation based on recommendations from a veterinarian. The methods used to provide needed nutrients will vary with each individual case, depending on appetite, prevalence of disease, and severity of emaciation. If the horse is unable or unwilling to eat, feeding by alternate means to provide the body with nutrients may be needed. Ration amounts should be gradually introduced by closely monitoring intake amounts and feeding schedules. Small, frequent feedings of high-fiber feedstuffs are best, especially in the early stages of refeeding. Examples of high-fiber feeds include grass or legume hay, beet pulp, and many complete feeds. As with any feeding program, horses should have free choice access to fresh, clean water. Salt or mineral blocks can be used as well, and are recommended if the mineral content of the diet is unknown.

Feeding and housing environment can play a large role in the success of a refeeding program. Housing and feeding the starved horse alone is ideal in order to regulate feeding rates and monitor intake. If possible, housing near a herd is helpful in promoting normal behavior and avoiding vices. Starved horses can be placed with other horses only if absolutely necessary and if the herd is compatible. Shade and a windbreak should be available in any housing setting. During the refeeding period and time of regaining a healthy weight, it may be useful to house the horse out of sight of the casual visitor who may feel compelled to give additional feedstuffs due to the higher risk of refeeding syndrome.

Healthy weight gain should be achieved over time and is often a very slow process if done correctly. Starved horses can safely gain 0.5 to 1 pound of body weight per day, sometimes amounting to a year or more to safely move a horse from a BCS of 1 to a BCS of 5. Horse's body condition score should be assessed approximately every 4-6 weeks. Generally, in order to achieve 2.2 pounds of body weight gain, an additional 16-24 Mcal of digestible energy above maintenance

requirements is needed. A change of 35-45 pounds of body weight is needed to reflect an increase in 1 body condition score.

Feeding Forages

Alfalfa hay is considered best for starved horses as it is very palatable while providing a high nutrient content and quality. Alfalfa is typically low in sugar and starch, therefore reducing the risk of refeeding syndrome when compared to concentrate diets. In the event that alfalfa hay is unavailable in sufficient quantities or is simply too expensive, grass hay can be a successful alternative. On average, twice as much grass hay is needed during the initial stages of refeeding compared to alfalfa hay. As in any good nutritional management program

all hay should be tested to determine nutrient content and create a feeding plan based off the nutrients provided by the forage. All hay fed to starved horses should have a crude protein percentage (CP%) of greater than 14 percent, an acid detergent fiber percent (ADF) of less than 40 percent, and a neutral detergent fiber percentage of less than 53 percent on a dry matter basis. General recommendations for feeding alfalfa and grass hays to emaciated horses can be found in table 2. Old hay that has been stored for 1 year or more should not be used, since the concentrations of many nutrients including fat soluble vitamins will have decreased over time. Additionally, hay that is dusty or moldy should not be fed to horses (image 4). If good quality baled hay is not

Table 2: Feeding Recommendations for the Starved Horse

Feedstuff	Feeding Recommendations		
	Days	Amount	Frequency
Alfalfa Hay ^a	1 to 3 4 5 6 to 14 15 to several months	1 lb 2 lbs 3 lbs 4 lbs Free choice	Every 4 hours Every 6 hours Every 8 hours Every 8 hours Every 12 hours
Grass Hay ^a	1 to 3 4 5 6 to 14 15 to several months	2 lbs 4 lbs 6 lbs 8 lbs Free choice	Every 4 hours Every 6 hours Every 8 hours Every 8 hours Every 12 hours
Concentrates ^b	14 or later 17 or later 21 or later 23 or later Continue until desired level is achieved	0.5 lb 1 lb 1.5 lbs 2 lbs Feed no more than 0.75% of body weight per feeding	Every 12 hours Every 12 hours Every 12 hours Every 12 hours Every 12 hours

^aHay should be tested to determine nutrient content. Feeding rates can be adjusted if needed to meet nutritional needs.

^bConcentrates should only be fed if needed and after the emaciated horse has adjusted to a refeeding program. Concentrate feeding amounts can be increased until a weight equivalent to 0.75 percent of body weight per feeding is achieved.

Image 4: Moldy hay should not be fed to horses.



Selecting a good quality forage when refeeding starved horses is important for healthy recovery. Legume or grass hay should be of high quality, and should be mold and dust free. If good quality baled hay is unable to be found, hay cubes, pellets or other forage replacers can be used.

available, consider using hay pellets, hay cubes or other forage replacers.

Feeding Concentrates

While alfalfa and grass hays can be used to safely and adequately increase weight gain, emaciated horses will regain weight more quickly if concentrate feedstuffs are incorporated into the diet. Concentrates should not be fed to starved horses for at least 2 weeks after refeeding begins. A strict feeding schedule should be followed and horses should never consume more than 0.75 percent of their body weight in a single concentrate meal (table 2). Commercial horse feeds high in fat and fiber are preferred for refeeding conditions while those high in starch and sugars should be avoided. Feeds should be highly palatable and easy to chew as many starved horses also have dental issues due to neglect. Concentrate feeds marketed for senior horses are a good choice as they are manufactured to be highly digestible, easy to chew, and are high in fiber. Senior or

complete feeds tend to be lower in calories than other concentrates designed for other life stages and workloads and, therefore, must be fed in higher quantities in order to meet the horse's daily nutrient needs.

Feeding Fat

Fat supplementation can be utilized to increase caloric density. In order to do so, fats are often poured on top of a concentrate feed (top dressed). Incorporating fat supplementation into the diet should be done gradually over a 2- to 3-week period to avoid gastrointestinal upset. Incorporating additional fat into the diet of a starved horse should follow an initial adaptation period to traditional concentrates and when additional caloric intake is needed to achieve weight gain at the previously recommended rate. Fat supplementation should not be introduced until at least 30 days after refeeding has begun. Initially, ½ cup of corn, soy, canola, vegetable or fish (menhaden, tuna or krill) oil can be added to the diet per day, increasing the volume by ¼ cup every 5 days until the desired level of supplementation is achieved. A practical guideline is to feed no more than 3.5 ounces of oil per 220 pounds of body weight per day. One standard measuring cup holds 8 ounces, which is equivalent to approximately 0.5 pounds of oil, or approximately 2 Mcal of digestible energy. It is important to note that high levels of fat supplementation can cause imbalances of other dietary nutrients; therefore, consideration should be given to ensure the diet remains adequate to meet the horse's daily nutritional needs determined by the current body weight.

Environment

Horses that are in a debilitated state due to starvation should be separated and housed away from other horses. Only if the horse is compatible with other horses in the band or group should it be allowed with other horses.

Since horses are social animals, the recovering horse should be housed within sight and sound of other horses in order to promote normal behavior and prevent the horse from developing vices, or stereotypies. Feed, water and shelter should be provided, and the shelter should be well ventilated to prevent the likelihood of the horse developing respiratory disease. It is advisable that the recovering horse be out of sight of the “well-intentioned” visitor who may feed the horse more than the recommended amount of feed or even file an animal abuse complaint.

Dental Correction

Once critical veterinary problems have been addressed, correction of dental problems will aid in recovery by allowing the horse to utilize more of the nutrients that are consumed. However, dental work can stress the horse, and tranquilization can lower the horse’s blood

Image 5: Points and hooks can impact a horse’s ability to eat.



Image credit TheHorse.com

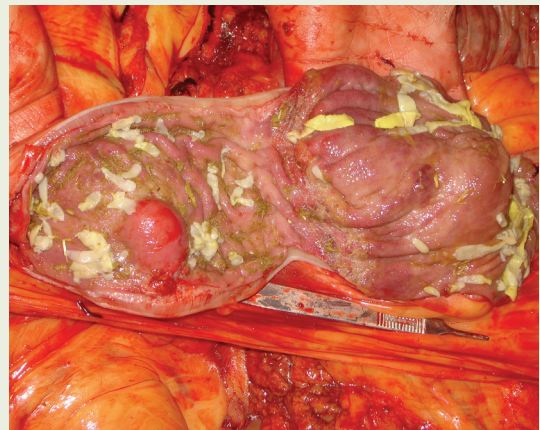
Dental problems can arise in horses due to neglect. Sharp points and hooks can become painful to the horse and prevent proper chewing. Often, dental problems will result in weight loss, as the horse is not able to ingest the proper amount of feed on a daily basis.

pressure. Thus, heavy sedation should be avoided in horses with poor body condition. If possible, allow dental procedures to be delayed for about 10 days after start of refeeding unless the dental problems are interfering with the horse’s recovery.

Deworming

The majority of starved horses will be infested with internal parasites. A veterinary directed deworming plan should be implemented to reduce stress, diarrhea and colic (image 6). It is advised to perform a fecal egg count to determine parasite burden and species present to formulate an efficient treatment plan. A general treatment plan should include a dewormer containing a macrocyclic lactone and praziquantel. Consult with your veterinarian to determine the correct plan for the horse’s condition.

Image 6: Tapeworm infestation of the small intestine.



Care should be taken to prevent parasite infestation in horses. Recommended practices include completing a fecal egg count to determine parasite burden and species present. Results of the fecal egg count are then used to create an effective deworming plan.

General Preventative Health Care

Frequently, the medical history of neglected horses is unknown, and previous vaccination records are unavailable. Due to the stress on the horse's immune system, the horse is not likely to develop immunity to vaccines that are administered during the first 2 weeks of recovery. Therefore, the horse will be especially susceptible to contagious diseases from other horses, which is why isolation and exercising caution of biosecurity is important. After the initial 2-week period, the horse should be examined by a veterinarian and vaccinated against the recommended core diseases. The American Association of Equine Practitioners recommendations for vaccinations are:

- Eastern and Western Encephalomyelitis.
- West Nile Virus.
- Rabies.
- Tetanus Toxoid.

Hoof Care

A neglected horse will likely have unique issues that will require special measures for hoof care. It is imperative that you work closely with a credible, experienced farrier to address the special needs of horses with little previous care. Radiographs may be needed to detect any internal damage and to create a plan to address angles and trims. Changes in hoof angles and balance need to be made slowly over several visits so that the horse can adapt to the changes in foot position. If proper nutrition and veterinary care are provided, a healthy hoof capsule will regenerate and a hoof wall can be grown in less than a year.

When to Consider Euthanasia

Humane or economic considerations may make euthanasia the best humane option for the horse in some situations. Euthanasia should be considered when:

- The horse is in body condition score of 1 and shows no improvement following 60 days of refeeding.
- The horse cannot stand or has been down for 5 days or more.
- The horse has serious health problems determined by a veterinarian.
- The horse will not eat.
- There is evidence of heart, liver and kidney failure.
- In spite of proper care, the horse does not show improvement within 14 days (exception for weight gain timeframe of 60 days listed above, as 14 days is not long enough for weight gain to be noticeable).
- The labor and money for proper care of the horse is unavailable.

Recovering the Malnourished Horse

Standardized guidelines for the care and feeding of starved horses are not widely available. Minimal research, case studies, diseases that often accompany malnourished horses, and the sensitive nature of starved horses to abrupt changes makes recovering these animals challenging. So, each case should be evaluated and addressed on an individual basis. For more information on caring for starved horses, contact your county Extension agent, veterinarian or equine Extension specialist.

Resources

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