

Re-Feeding the Rescue Horse by Lori K. Warren, PhD, PAS

Unless you've been hiding under a rock, you are undoubtedly aware of the sorry state of the economy. While this downturn has affected our stock portfolios and perhaps our job security, it has also impacted the horse industry.

A relative surplus of horses, coupled with the rising cost of upkeep, has led to a tremendous increase in the number of "unwanted" horses. Rescue facilities have been overwhelmed with horses that have been surrendered by owners who are no longer able to care for them, as well as horses seized by animal control agencies due to abuse or neglect. Many of these horses are thin, if not downright starving. While our first instinct is to pour on the feed, in some instances this may hurt the horse rather than help.

If you manage a horse rescue facility or are considering fostering an unwanted horse because you have extra room in the barn, this article will help you navigate the early re-feeding process. Or, if you have a horse that is underweight, this article will give you feeding suggestions for promoting safe weight gain.

The Starvation Process

When the body does not receive adequate calories or other nutrients in the diet, it begins to consume itself. In the beginning, any fat and carbohydrate stored in the body will be used to supply the energy needed to maintain normal body functions. When these sources are depleted, energy will be derived from the breakdown of body proteins.

Although protein is second only to water in its abundance in the body, it exists to play specific functions as tissues, enzymes, hormones and antibodies. Little to no extra protein is stored. During the advanced stages of starvation, the protein in muscles, as well as vital organs, such as the heart, kidneys, and tissues of the digestive tract will be broken down for energy. Because these organs are necessary for life, their continued dismantling will result in organ failure and death.

Get Your Veterinarian Involved

There are many causes of weight loss. Most commonly, severe weight loss results from an inadequate quantity and quality of feed, or seasonal declines in pasture if it serves as the primary feed source. Horses can also become emaciated due to chronic deficiencies of certain vitamins and minerals, malabsorption of nutrients resulting from diarrhea or poor dental function, intestinal parasites, and pathological conditions such as cancer, infections, or diseases of the liver, kidneys or pancreas.

Regardless of the cause of the weight loss, the health of the horse should be evaluated by a veterinarian before initiating any changes in the nutritional program. This is particularly true for horses that are extremely thin or emaciated and/or have an unknown history. In addition to a physical exam, a veterinarian will need to assess the horse's parasite load and dental health, as well as perform routine blood tests to evaluate metabolic status and organ function.

Re-Feeding the Starved Horse

The feeding of emaciated or thin horses that have a body condition score of 1 to 3 (see [SIDEBAR](#) “Evaluating Body Condition”) and a history of prolonged feed deprivation must be done with extreme care. Although our instinct is to provide horse with all the feed it wants to eat, this may actually result in more harm than good.

Humans suffering from starvation caused by illnesses such as anorexia or cancer can develop heart, respiratory, and kidney failure, convulsions, coma and sudden death within 3 to 5 days when given concentrated sources of calories, primarily in the form of glucose. This “re-feeding syndrome” has also been reported in emaciated horses fed calorie-rich, grain-based feeds.

A major concern with re-feeding is the marginal stores of electrolytes and minerals left in the body after starvation. Feeding high levels of starch (such as that found in grains like oats and corn) and sugar (found in molasses) stimulates insulin production from the pancreas. Insulin promotes the uptake of glucose, amino acids, electrolytes, phosphorus and magnesium by cells. This means even fewer of these depleted nutrients remain in circulation, which can quickly shut down organs.

Having less feed or no feed available for extended periods of time will also result in shrinkage of the gastrointestinal tract. In addition, starvation slows the rate of passage of feed through the gastrointestinal tract as the body makes every effort to extract nutrients. Feeding large quantities of feed during the early rehabilitation period can result in gastrointestinal distress and may result in impaction colic, and is therefore not recommended.

A final challenge in feeding the starving horse is a potential lack of appetite. Severe protein deficiency often results in disinterest in eating, which perpetuates the cycle. Illness and disease may also cause the horse to go off feed. In such cases, your veterinarian may elect to feed by nasogastric tube until the horse shows an interest in eating on its own.

Because starch/sugar-rich feeds, which are normally good sources of calories for promoting weight gain, are contraindicated during the initial re-feeding stages, what should be fed? Research conducted at the University of California at Davis found that gradually increasing the amounts of high quality hay were the most successful in supporting nutritional rehabilitation of starved horses. When the researchers compared the feeding of alfalfa hay, oat hay, and a commercially available senior feed over a 10-day period, alfalfa hay came out on top. Alfalfa is relatively low in starch (~3%) and rich in protein (~18%), and also provides phosphorus and magnesium. The oat hay was deemed too bulky and the senior feed had enough starch (19%) to elicit the unwanted insulin response, resulting in a shift in essential electrolytes and minerals.

A subsequent re-feeding study by the same California researchers compared alfalfa hay to a combination of alfalfa and corn oil. Oils are the most calorie-rich feed ingredient and do not elicit the release of insulin. Although the corn oil produced no harmful effects, substituting calories with corn oil rather than straight alfalfa decreased the total amount of protein,

phosphorus and magnesium consumed. This resulted in a progressive decline in the status of these nutrients in the blood, which was not advantageous to the rehabilitation process.

Ultimately, the best approach for the initial re-feeding of starved horses is frequent feeding of small amounts of high-quality alfalfa. This amount should be increased slowly at each meal and the number of feedings decreased gradually over 10 days. This first 10 days is the time period critical to successfully transitioning the digestive tract from a starved to a fed state. Involving your veterinarian during this phase is essential to help circumvent problems. An example feeding program is presented in Table 1. After 10 days to 2 weeks, horses can be fed hay in increasing amounts to reach a level of free-choice hay. Grain supplementation is not recommended until the horse is near normal body weight, usually 6 months following the initiation of re-feeding.

Promoting Safe Weight Gain in the Thin Horse

Older horses, as well as those that are timid in group feeding situations may not have the opportunity to eat enough to maintain body weight. Pregnant and lactating mares and horses in training may also lose weight if their diet is not adjusted to meet their higher caloric requirements. As stated above, you should have the horse evaluated by a veterinarian to help pinpoint the cause of the weight loss.

If you are fostering a thin horse and are unfamiliar with his feeding history, you should proceed cautiously. In such cases, it may be more prudent to follow the early re-feeding guidelines recommended above for starving horses, even if the horse does not appear emaciated.

If you have a horse that is thin (body condition score of 3 or 4), but not emaciated or starving (i.e., he has not been severely malnourished for prolonged periods), you have more options for promoting safe weight gain. Recognizing that there is a limit to the amount of feed a horse can possibly eat in one day, focus should be on energy-rich ingredients will help provide the extra calories needed without excessive bulk. The following are a summary of options for adding calories to the diet:

- *Adding grain or a grain-based feed* – for many horses, adding additional grain to the diet, whether it is oats, sweet feed or pellets, can be very useful for providing extra calories. However, because of the risk for potential digestive upset, each feeding of grain (including any extra added for calories) should be limited to less than 5 pounds per meal. Caution: grain feeding and/or high starch diets should be avoided in horses that have history of laminitis, as well as those diagnosed with Cushing's disease or other metabolic disorders.
- *Switch to a better quality hay* – although not as calorie-rich as cereal grains or oils, changing from a grass hay to a legume, such as alfalfa, or even a grass/legume mix will provide more calories per pound of hay eaten. If you want to stick with grass hay, select bales that are leafy and have finer stems with small, soft seed heads. Grass hay also offers the advantage that it can be fed free-choice, allowing the horse to eat its fill.

- *Incorporate highly digestible fiber sources* – beet pulp and soy hulls are high fiber roughages that are easily digested by the horse. In fact, on a pound-for-pound basis, beet pulp has a similar amount of calories as oats, and soy hulls are similar to an excellent quality grass hay. And because the calories originate from fiber, they also present less risk for digestive upset than starch-rich cereal grains like oats or corn. Beet pulp and soy hulls can be used to replace some of the grain in the diet, or some of the forage.
- *Add oil or other high fat ingredients* – Vegetable oils, such as soy oil or corn oil, are a rich source of calories. Rice bran is also high in fat (~20%). For an average 1100-pound horse, up to 2 cups of oil or 2 pounds of rice bran can be added to the daily ration, which provides the same amount of calories as 3 pounds of oats. If the horse is already receiving a fat-added feed, the amount of additional oil or rice bran may have to be cut in half. Caution: if the horse has been diagnosed with liver failure, oils and other high fat feeds should be avoided.
- *Commercially available fat- and fiber-added feeds* – there are many feeds on the market that have already have fat and highly digestible fiber sources added to them. These commercial preparations have the advantage of being formulated for specific classes of horses and fortified to provide balanced amounts of necessary nutrients. For the mature horse that needs to gain weight, a formula that is high in fat (crude fat 6 to 10%) and contains added good quality fiber sources (e.g., beet pulp, soy hulls, alfalfa meal) (crude fiber 10 to 18%) are a good choice. Some formulations may also contain cereal grains, which should pose no problem unless the horse has a history of laminitis or metabolic disease.

To be safe, weight gain takes time. A mature horse should gain no more than 1 pound per day. For the average 1100-pound horse, an additional 3 to 4 pounds of grain or fat/fiber-added feed, on top of what the horse is already eating each day will facilitate a gain of one body condition score in 60 days (e.g., from a score of 4 to 5). Alternatively, 2 cups of vegetable oil or 2 pounds of rice bran will accomplish the same thing. Remember to make any changes to the diet, such as an increase in the amount of feed or oil offered gradually over a 2-week period to reduce the risk of digestive upset.

Reality Check

People who take on the responsibility of a horse in need of nutritional rehabilitation are to be commended for their compassion. It can be a heart-wrenching experience to care for horse that arrives in a thin or emaciated condition. It is also not a simple process. Time and money must be committed and experience is needed or expertise must be recruited. Despite all good intentions, the suffering we hope to put an end to may be made worse without these factors in place.

Starving horses that have undergone prolonged caloric restriction are on death's door. If they have lost more than half of their ideal body weight (e.g., a 500-pound horse that should weigh 1100 pounds), their chances for survival are low. For the others, a program of small, frequent meals of good quality alfalfa hay, coupled with continuous monitoring by a veterinarian, has shown the greatest success.

For the horse that is underweight, but clinically normal, the addition of calorie-rich feeds to the diet will help promote weight gain over time. Vegetable oils, rice bran, beet pulp, and soy hulls offer calories without the risk of digestive upset associated with starch-rich grains. Commercial fat/fiber-added feeds with low to moderate levels of starch offer these ingredients, along with peace of mind that a balanced diet is being offered.

Finally, it is important to realize that starvation often has long-lasting psychological and physiological effects. For example, some horses will be aggressive at meal times and may always have to be fed separately from other horses. They may also “bolt” their feed, thus increasing their risk for choke. Organ damage sustained from starvation and parasites should be evaluated and the long-term diet adjusted accordingly. A physical exam to ascertain damage to the heart is also particularly important if the rehabilitated horse will be used for riding or other types of exercise.

Table 1: Re-feeding recommendations for the Starved Horse^{1,2}

Day	% of Calorie Requirement offered per day ³	Number of Meals per day	Amount of Alfalfa hay ⁴ per meal
Days 1 – 3	50 %	6 meals (every 4 hours)	1.25 to 1.5 Lbs/meal
Days 4 – 5	75 %	6 meals (every 4 hours)	2.0 to 2.25 Lbs/meal
Days 6 – 10	100 %	3 meals (every 8 hours)	Increase to 5.5 Lbs/meal

¹ Adapted from Witham and Stull (1998) J. Am. Vet. Med. Assoc.

² Based on a starved horse with a projected normal bodyweight of 1100 pounds.

³ Calorie requirement (known as Digestible Energy, or DE) can be calculated using the formula:

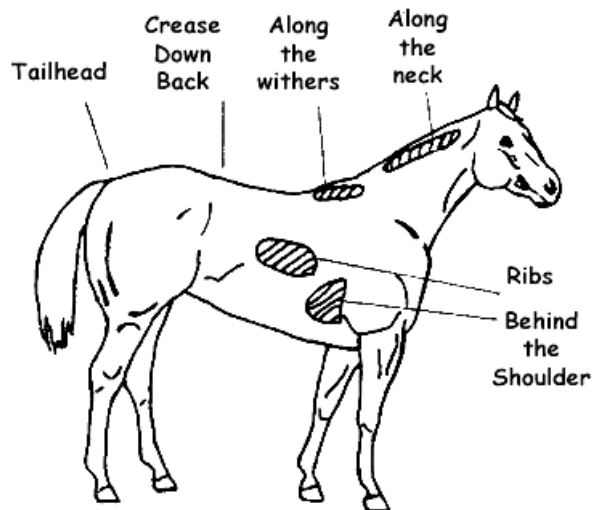
$$\text{Mcal DE/day} = 1.4 + (0.03 \times \text{body weight in kilograms})$$

⁴ Based on alfalfa hay with 1.05 Mcal/Lb of hay (As-fed basis).

Evaluating Body Condition (SIDEBAR)

Body condition can be evaluated on a scale of 1 (emaciated) to 9 (obese) by observing and palpating fat cover in 6 key areas: along the neck, along the withers, over the ribs, behind the shoulder, crease down the back, and the tailhead. Horses should be maintained in a healthy body condition of 5 to 6 (moderate to moderately fleshy).

Assessing body condition is particularly useful for tracking weight gain if a livestock scale is not available. Horses should be evaluated and assigned a body condition score when they arrive and at 1 to 2-week intervals to assess progress. Weight tapes (which are often provided with deworming medications) can also be used, but are prone to error with severely underweight horses. Rather than recording the “weight” given on the tape, it is recommended to record the inch measurement to evaluate weight gain.



Jill—

This is not the greatest resolution figure, but I'm sure you can easily re-create.

Didn't you publish a BSC system in a recent issue? If so, maybe you can print the two paragraphs above and the scoring area diagram and then refer the reader to that issue or article online. Otherwise, I've provided a summary of each score below.

Score	Description
1 Extremely emaciated	No fatty tissue can be felt; All bones extremely noticeable.
2 Emaciated	Slight fat covering over vertebrae; Hip bones prominent; bones of withers, shoulders and neck are faintly discernible.
3 Thin	Slight fat cover over vertebrae; tailhead prominent; ribs easily discernible; withers, shoulder and neck accentuated.
4 Moderately thin	Slight ridge along back; faint outline of ribs discernable; withers, shoulder and neck not obviously thin.
5 Moderate	Back is flat with no crease or ridge; ribs easily felt but not seen; withers rounded; shoulders and neck blend smoothly into body.
6 Moderately fleshy	Slight crease down back; fat over ribs and tailhead; fat beginning to be deposited along side of withers, behind shoulders, and sides of neck.
7 Fleshy	Crease down back; ribs can be felt but noticeable fat between ribs; fat deposited along withers, behind shoulders, and sides of neck.
8 Fat	Definite crease down back; difficult to feel ribs; thickening of neck; areas along tailhead, withers, behind shoulders, and between thighs filled with fat.
9 Obese	Obvious deep crease along back; patchy fat over ribs; fat bulging around tailhead, withers, behind shoulders, along neck, between thighs and near flank.