

# Enteral Nutrition In The Adult Horse

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**Proper nutrition helps horses rapidly recover from surgery and clinical diseases. Protein and calorie malnutrition develop quickly when a horse does not consume enough feed. Poor nutrition hinders immune system function, delays wound healing, and can prolong hospitalization. Enteral nutrition provides essential calories and nutrients to sick anorectic horses.**

Enteral nutrition for a sick or hospitalized horse provides a blend of nutrients that is administered in a liquid form. As a result, these nutrients are provided directly to the enterocytes in a physiologic manner. Studies in many species show an improved recovery from surgery, decreased cost of hospitalization, and decreased bacterial translocation across the intestinal tract when enteral nutrition is administered to clinically ill patients.<sup>1-3</sup>

When a horse is anorectic, or is unable to eat, treatment with a balanced enteral diet ensures that the horse is provided with nutrients to meet part to all of their energy, protein, vitamin, mineral, and fatty acid requirements.

## **Managing the Anorectic Horse: Enteral Immunonutrition Formula**

Enteral Immunonutrition should provide a balance of energy, protein, and other critical nutrients including glutamine, arginine, omega-3 and omega-6 fatty acids, vitamins, and minerals to an anorectic horse. Fiber should be included to more closely match the forage-rich diet of the healthy horse, and high quality whey protein should be included to facilitate the maintenance of muscle mass. Glutamine is a preferred nutrient source for intestinal enterocytes, and arginine promotes the production of nitric oxide needed to enhance the immune system.<sup>4-5</sup> A blend of B vitamins supports cellular metabolism to ensure adequate levels in horses with gastrointestinal

disease. Macro and trace minerals are needed to provide essential nutrients. Antioxidants including vitamin E, vitamin C, and selenium are important to protect against ongoing cellular oxidative damage. Omega-3 fatty acids should be included to help modulate the inflammatory immune response.

## **Initiating Treatment**

When a horse has been anorectic for 36-48 hours, enteral diet therapy should be considered in the treatment plan. Enteral diets are used to manage horses that have normal intestinal motility, can tolerate placement of a nasogastric or esophagostomy tube, and are able to stand or remain sternal during diet therapy. Enteral nutrition is easy to administer, and horses can be fed both in a field setting and in a veterinary clinic. The only pieces of equipment needed to administer an enteral immunonutrition formula are a nasogastric tube, a bucket, and a stomach pump.

## **How to Feed an Adult Horse with Enteral Nutrition**

### **1. Determine the energy and protein requirements of the horse**

Adult horses that are clinically ill or that are recovering from surgery can initially be fed to meet their resting energy requirements. Energy and protein requirements are shown in Chart 1. If the horse tolerates the diet but loses body weight or muscle condition, then additional sources of energy

Chart 1. **Daily Nutrient Requirements for Critically Ill Adult Horses**

|   |                                    | Category             | Digestible Energy (kcal) | Crude Protein (grams) |
|---|------------------------------------|----------------------|--------------------------|-----------------------|
| <b>Mature Horse Body Weight Classifications</b> | <b>Ponies</b><br>440 lbs (200 kg)  | Resting              | 5,200                    | 216                   |
|   |                                    | Maintenance, minimum | 6,100                    | 216-252               |
|   | <b>Horse</b><br>880 lbs (400 kg)   | Resting              | 9,400                    | 432                   |
|   |                                    | Maintenance, minimum | 12,100                   | 432-504               |
|   | <b>Horse</b><br>1,100 lbs (500 kg) | Resting              | 11,500                   | 540                   |
|   |                                    | Maintenance, minimum | 15,200                   | 540-630               |
|   | <b>Horse</b><br>1,320 lbs (600 kg) | Resting              | 13,600                   | 648                   |
|   |                                    | Maintenance, minimum | 18,200                   | 648-756               |
|   | <b>Horse</b><br>1,540 lbs (900 kg) | Resting              | 24,140                   | 972                   |
|   |                                    | Maintenance, minimum | 27,300                   | 972-1134              |

Modified from National Research Council (NRC): Nutrient Requirements of Horses, 6<sup>th</sup> ed. Washington, DC, National Academy Press, 2007.

or protein may be necessary. The recommended range of volumes of a commercially-available enteral formula to feed at each meal for adult horses of different body weights is listed in Chart 2.\* If the horse has been anorectic for more than 5 days, 1/3-1/2 of the total recommended volume should be provided on the first day of feeding. Gradually increase the volume over 2-3 days until you are feeding the full recommended volume.

## 2. Prepare the diet

Mix the enteral formula with the recommended volume of warm water. A wire whisk can be used to blend the diet. Test the consistency of the diet by infusing it

\*Examples provided pertain to Platinum Performance® Enteral Immunonutrition Formula.

through the selected nasogastric tube. If necessary, add more water to the solution so it can easily be infused through the nasogastric tube. Keep track of the volume of water that is added to the formula to ensure the horse does not become overhydrated. The water administered with the diet can be included as part of the horse's daily fluid requirement.

Chart 2. **Determine the Amount of Enteral Formula\* to Feed At Each Meal. Feed 3 meals each day.**

| Horse Body Weight | Amount of Platinum Enteral |           | Meal Dose of Water liters |
|-------------------|----------------------------|-----------|---------------------------|
|                   | scoops                     | grams     |                           |
| 400 lbs           | 3-5                        | 300-500   | 2                         |
| 450 lbs           | 4-5                        | 400-500   | 2-3                       |
| 500 lbs           | 4-6                        | 400-600   | 2-3                       |
| 550 lbs           | 5-7                        | 500-700   | 2-3                       |
| 600 lbs           | 5-7                        | 500-700   | 2-4                       |
| 650 lbs           | 5-8                        | 500-800   | 3-4                       |
| 700 lbs           | 6-8                        | 600-800   | 3-4                       |
| 750 lbs           | 6-9                        | 600-900   | 3-5                       |
| 800 lbs           | 6-10                       | 600-1000  | 3-5                       |
| 850 lbs           | 7-10                       | 700-1000  | 3-5                       |
| 900 lbs           | 7-11                       | 700-1100  | 3-5                       |
| 950 lbs           | 7-11                       | 700-1100  | 4-6                       |
| 1,000 lbs         | 8-12                       | 800-1200  | 4-6                       |
| 1,050 lbs         | 8-13                       | 800-1300  | 4-6                       |
| 1,100 lbs         | 8-13                       | 800-1300  | 4-7                       |
| 1,150 lbs         | 9-14                       | 900-1400  | 4-7                       |
| 1,200 lbs         | 9-14                       | 900-1400  | 5-7                       |
| 1,250 lbs         | 9-15                       | 900-1500  | 5-8                       |
| 1,300 lbs         | 10-16                      | 1000-1600 | 5-8                       |
| 1,400 lbs         | 10-17                      | 1000-1700 | 5-8                       |
| 1,500 lbs         | 11-18                      | 1100-1800 | 6-9                       |
| 1,600 lbs         | 12-19                      | 1200-1900 | 6-10                      |

### 3. Administer the diet

Select a nasogastric tube to be used to administer the diet. A small diameter tube should be used if the tube will remain in place for more than one feeding. Place the tube and check the stomach for residual fluid. If more than 2 liters of fluid are removed from the stomach, do not feed the diet and wait 2 hours before checking for residual fluid. If less than 2 liters of residual fluid are removed, slowly administer the diet. Do not pump the solution too quickly. Once all of the diet has been administered, rinse the tube with an additional 1-2 liters of warm water. Most standard size adult horses can tolerate infusion of a total of 6-8 liters of fluid. Horses that have been anorectic for longer than 5 days should be fed with a smaller volume (<4 L/feeding) of fluid. The diet and flush water volume should be adjusted to meet the needs of Miniature horses and ponies. After the tube has been flushed either remove the tube, or cap the tube if it will remain in place between feedings. Use a muzzle to prevent the horse from removing an indwelling tube.

### 4. Monitor the horse

During the time you are managing the horse with an enteral immunonutrition formula, perform a physical examination on the horse and monitor its body weight and body condition score daily. Digital pulses should remain within normal limits. If the horse develops ileus, nasal discharge, or respiratory stridor and cannot tolerate the feedings, then enteral feeding should be discontinued. Many horses will develop mild diarrhea when an enteral diet is first introduced. The diet can continue to be used as long as the horse remains stable and does not have evidence of infectious diarrhea or dehydration. Basic blood work, which includes measuring the packed cell volume, total solids, and electrolytes, should be performed, if possible. The horse should remain hydrated, and its electrolytes should be stable during the period of enteral diet administration.

### 5. Return the horse to a diet of forage

Horses should be offered high-quality hay to entice them to eat during the time they are fed the enteral

diet. Grass hay, alfalfa leaves, and small amounts of pasture grass can all be offered during the refeeding period. If the horse is insulin resistant or has laminitis, then the hay should be soaked before it is fed and fresh grass should be avoided. Pelleted hay and complete feeds that have a low concentration of non-structural carbohydrates (NSC <15%) can also be used. Once the horse can voluntarily consume between 50-75% of its energy requirements, then the enteral feeding can be discontinued.

### Putting it into Practice

- Adult horses that are anorectic rapidly develop protein calorie malnutrition.
- Enteral nutrition is a safe way to give nutrients to a horse that has a functioning gastrointestinal tract.
- An enteral immunonutrition formula can be used to provide a sick or anorectic horse with energy, protein, vitamins, minerals, antioxidants, and fatty acids.
- Enteral nutrition can be used for 7-14+ days to provide nutrition to an anorectic horse.

### Literature Cited

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