January 2008 **AG/Equine/2008-01pr**

Meeting the Energy Needs of the Horse

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Introduction

When it comes to feeding, many horse owners struggle with knowing what and how much to feed. Confusing words such as energy can also add to the struggle. When the word energy is mentioned, many think of it in terms of a horse as being excitable, uncontrollable or the opposite of not having enough momentum. The term energy can be used in many different ways when talking about the horse and nutrition. In this paper we will answer the question, "what is energy" and explain how it affects the horse from a nutritional aspect. For more information on the horse's digestive tract see AG/Equine/2006-01 and AG/Equine /2006-02.

What is Energy?

To put it simply, energy is the fuel used by the horse for all functions, including maintenance of body tissues, growth, lactation, performance, etc. Animals use the energy to produce heat and adenosine triphosphate, or ATP, which cells then use to function. Energy itself cannot be measured, but it can be converted to heat, which can be measured. We measure the energy stored in feed as megacalories (Mcal) or kilocalories (kcal). Kilocalories are also referred to as Calories (with a capital "C"). So, when we talk about energy, we are usually really talking about Calories.

Energy Sources for Horses

Horses like any other living being must have an energy source to continue functioning. Feed provides this energy. Not all of the feed eaten is available for energy as it is lost through the feces,

urine or gases and is called indigestible energy. The portion lost consists of indigestible food stuffs as the digestive tract is not 100% efficient. The portion remaining is used for maintenance, growth or fattening, milk production in the case of a brood mare, and physical activity. Energy can be supplied by carbohydrates, fats or proteins in the horse's diet. Feeds contain varying levels of these energy sources and so are fed at different quantities to balance the feed ration for the horse's needs. Below we will examine each source.

Carbohydrates include simple sugars, starches and fibers. Simple sugars are found in sugar cubes and molasses, and are usually only a minimal presence in horse's diet, even when the horse is eating a sweet feed with molasses.

Starches are compounds formed by several simple sugars linking together, and are found in grains and in the immature leafy portions of plants. During digestion, starches are broken down into the simple sugars, which are then absorbed primarily in the small intestine. These simple sugars may then be used as fuel immediately, or stored as glycogen

by the horse, which is usually the major fuel source for anaerobic activity, or stored as fat, which is a fuel source for aerobic activity.

Fibers (forages) are a very important component of the horse's diet as they are vital to proper function of the digestive tract. Fibers are also formed by the linkages of simple sugars, but the links are different from those in starches, so fibers are digested differently. Digestible fibers are fermented by the microbes in the horse's hindgut into volatile fatty acids (VFA), which are then absorbed. These VFA's are also a source of energy for aerobic activity. Some fibers are indigestible in the horse's digestive system and are passed out through the manure.

Fats are excellent sources of energy. Fats contain more than twice the calories per pound than either carbohydrates or proteins, so adding fat to the diet allows the horse to ingest more calories in a smaller quantity of feed. Research has shown that adding fat to the diets of performance horses may improve performance, such as increased stamina and delayed onset of fatigue. Also, fat-supplemented diets increase fat percentage of mares' milk during lactation. Finally, adding fat to the horse's diet will not increase the risk of digestive disturbances such as colic and laminities that can occur with a high starch (grain) diet.

Protein is not an efficient source of energy for the horse. Protein is only used as energy when more is fed than is needed to meet the horse's amino acid requirements and the process of converting excess amino acids to an energy source actually requires more energy expenditure. Therefore, adding protein to an already adequate diet is of little or no benefit when more energy is required.

Energy Requirements of the Horse

A horse requires a certain amount of energy per day. If more calories are supplied on a daily basis then needed, a horse will convert this extra energy into body fat. Long-term over feeding can lead to obesity and other health problems in horses. On the other hand, if too little feed is fed on a daily basis, a horse will convert its fat stores to energy. This will lead to loss of weight. In extreme conditions, when fat stores are depleted, a horse can convert muscle tissue to energy which can cause a horse to become extremely thin and emaciated.

As a rule of thumb, horses will consume approximately 1-3% percent of their body weight in feed per day. Therefore, a 1,000 lb horse would consume approximately 10 – 30 lbs of feed daily. Every horse needs at least a minimum of 1% of their body weight a day in dried roughage or equivalent pasture for healthy hind-gut function. The total intake will vary depending on forage quality and various energy needs including activity, lactation and growth. Below is a chart that estimates intake based on the horse's body weight.

ESTIMATED FEED CONSUMPTION BY HORSES*

% Body Weight of Air-Dried Feed (about 90% DM)

*Nutrient Requirements of Horses, 1989

	FORAGE	CONCENTRATE	TOTAL
MATURE HORSES			
Maintenance	1.5-2.0	0-0.5	1.5-2.0
Mares, late gestation	1.0-1.5	0.5-1.0	1.5-2.0
Mares, early lactation	1.0-2.0	1.0-2.0	2.0-3.0
Mares, late lactation	1.0-2.0	0.5-1.5	2.0-2.5
WORKING HORSES			
Light work	1.0-2.0	0.5-1.0	1.5-2.5
Moderate work	1.0-2.0	0.75-1.5	1.75-2.5
Intense work	0.75-1.5	1.0-2.0	2.0-3.0
YOUNG HORSES			
Nursing foal, 3 months	0	1.0-2.0	2.5-3.5
Weanling foal, 6 months	0.5-1.0	1.5-3.0	2.0-3.5
Yearling foal, 12 months	1.0-1.5	1.0-2.0	2.0-3.0
Long yearling, 18 months	1.0-1.5	1.0-1.5	2.0-2.5
Two year old, 24 months	1.0-1.5	1.0-1.5	1.75-2.5

Knowing how much your horse weighs is an important aspect to any management program. The use of a walk on scale or a weight tape can assist with determining the amount a horse should be fed, along with the horse's work load.

A horse at maintenance can usually meet their energy requirements on good quality hay and/or pasture alone, along with access to free-choice salt and fresh water. As energy requirements increase

due to exercise, lactation, or growth, the horse may not be able to meet its energy needs solely from hay or pasture. This is when grains or higher fat concentrates are added to the diet to meet these energy needs. Roughages (hay) are lower in energy and higher in fiber than concentrates and help maintain healthy gut motility. If a concentrate or grain is fed, roughages should make up at least 60 - 70 % of the horse's total diet but not less than 50% of the diet.

Fat Added Diets

For many years, grains (corn, oats, barley, etc.) were added to the diet as a way to increase the calorie intake. Grains are higher in calories per pound than hay and can be added to the diet in moderation. The rule of thumb is to feed no more than 0.05% of a horse's body weight in one feeding if feeding grains (that is no more than 5 lbs per feeding for a 1,000 lb horse). Excessive amounts of starch (usually from a grain overload or very lush vegetation) can overflow into the cecum and large colon causing problems with the microbial populations in the hindgut which can lead to colic and/or founder.

Over the past 30 years research has shown that by adding higher levels of fats and fermentable fibers to grain sources, overall calories can be increased, while reducing levels of incoming starch from large straight grain diets. Samples of fermentable fibers added to horse diets include: beet pulp, wheat bran, oat hulls and rice hulls. Samples of higher fat ingredients added to horse diets include: the many varieties of vegetable oils, rice bran and flaxseed. In doing so, you can decrease the chances of digestive problems mentioned above. Today, many manufactured concentrates have higher levels of fat (around 6 -12%) and fermentable fibers added to them. This means you can feed these at lower levels but still meet the higher energy needs of the horse. In addition, many of these manufactured concentrates are also balanced with protein, vitamins and minerals to complete the horse's diet.

When determining how much concentrate to feed, follow the guidelines listed in the chart above as a place to start. If buying a manufactured feed, follow the feeding recommendations on the bag or call the companies' customer service number for advice. Higher fat concentrates will tend to cost a little more but can be fed in smaller amounts to meet the same calories equivalency as straight grains or lower fat feeds. And finally, always monitor your horse's body condition to determine if it is receiving adequate calories for its age, activity level and lifestyle. (For more information on Body Condition Scoring refer to AG/Equine/2005-01).

Summary

Horses need energy for all body functions. A good quality roughage source should always remain the staple of the horse's diet for proper digestive function. If additional energy is needed, it can be provided through feeding higher calorie fermentable fibers, grains, or higher fat concentrates. Providing a balanced diet with enough calories will keep your horse in good weight, healthy and with enough energy for all its needs.

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This publication is issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Noelle Cockett, Vice President for Extension and Agriculture, Utah State University.