



Protein

by HEATHER SMITH THOMAS

Protein is one of the basic nutrient elements of diet, along with fats, carbohydrates, vitamins and minerals. Protein is necessary to the life and well being of the horse, crucial for tissue growth and repair.

Shea Porr, PhD, Assistant Professor (Agricultural Technologies, Ohio State University) explains that protein is comprised of amino acids, which are the building blocks of any protein tissue in the body—whether muscle, bones, tendons, hormones, skin, hair hoofs, etc. So the proteins are very different, depending on what they do, she says.

“The horse gets protein from his feed. Certain feeds have more protein, depending on their structure and the way they are made. Within the forages—which should always be the base of a horse’s diet—the legumes have more protein than the grasses. Grains will have a variable amount of protein, usually less than the legumes. They could be equal to grasses, depending on the quality of the grasses,” says Porr.

“Manufacturers usually add protein supplements to concentrate feeds. Alfalfa can be anywhere from 14 percent crude protein, to over 20 percent, which is very high for a forage. Grasses may run 10 to 14 percent, depending on the quality of the grass. Protein supplements will often run 40 to 45 percent crude protein. Soybean meal (a soy by-product) has one of the highest levels, as a protein supplement,” she says.

“When you are looking at concentrates, the grains will provide a little bit of protein, but the protein supplements added to the grain are what make up the bulk of the protein content. The most commonly used protein supplement in horse diets is soybean meal, and it’s usually in the form of a pellet. When you look at a sweet feed mix, if you see brown pellets, this is usually the protein supplement. If a concentrate contains green pellets, this is usually alfalfa meal, which is also used as a protein supplement,” says Porr.

How Much Does a Horse Need?

“Usually an adult horse will get plenty of protein from a good quality grass. Growing foals or lactating broodmares may need a little more protein than this, and you might want to feed legume hay in their diet. I am a strong advocate of a mixed legume-grass hay, or a mixed legume-grass pasture. I don’t think straight alfalfa or clover is good for the horses—it’s a little too rich. But a mix will usually meet their needs,” she says.

“Protein and energy are vital to lactating mares and growing foals. If the mare isn’t getting enough of the proper nutrients in diet (particularly protein), milk production will drop. Lactating mares need up to 14 or 16 percent protein in diet in order to meet the milk demand. The nursing foal needs 16 to 18 percent protein, but he gets that in his milk, and he’s nibbling his dam’s feed,” says Porr.

“He needs less by the time he’s weaned. With every phase—from weanling, yearling, 18-month-old to 2-year-old—you drop an average of two percent protein in dietary requirement, as a rule of thumb. For a weanling you are usually looking at 16 percent supplements. A yearling needs 14 percent. By the time a horse is three years old you are looking at 10 to 12 percent protein, and that’s more than enough to meet the need. The spike in growth occurs in the first month or two of age and slows progressively after that,” she says.

“If you wean a foal younger than four months, you must pay more attention to what you feed. If you wean early, use a milk-based protein. Those proteins are easier to digest than plant-based proteins,” she says. The young foal is nibbling grass and grain but his basic diet is milk. As he grows, he eats more forage and his digestive tract adapts to where it can utilize more. Gradually eating more solid feed allows the digestive tract to develop. By the time foals are ready to wean, they can handle it,” says Porr.

“Mature horses and exercising horses don’t need much protein. There is some breaking down and rebuilding of muscle with exercise, but the protein needs don’t go up very much. Many horsemen feed 12 and 14 percent concentrate—as a supplement—in addition to a high protein alfalfa type hay diet. Those horses are getting way more protein than they need,” she says.

This can be detrimental to a hard working horse if he is working in the heat. “Excess protein can have thermo-regulation consequences. The protein tends to burn hotter in the body, and produces a lot of internal body heat. When weather is hot and high humidity prevents a horse from sweating and cooling efficiently, if he is creating excessive internal body heat, this creates problems. Research for the Olympics in Georgia looked at high fat diets, because fat burns very cool,” says Porr.

“Some of the research in recent years shows that even horses doing an intense level of work can get by on eight to 10 percent protein in the diet, as long as it is a good quality protein, containing the limiting amino acids. The athletic horse can get by on a relatively low quantity,” she says.

There is research being done, looking at feeding less total protein, and using a little more of the specific limiting amino acids. “This is an avenue that is really interesting, because it shows that horsemen are overfeeding protein on a regular basis. This is ironic, because protein is one of the more expensive supplements that goes into a concentrate,” says Porr. In recent years, overfeeding some of these nutrients has become a bigger problem than underfeeding.

“Quite often we feed too much protein. In mature horses, it is usually not a problem for them, but it is costing us more money. When we look at growing horses, however, imbalances in nutrients are one of the things that lead to many of the developmental problems. It’s not that we can point a finger at any one nutrient. We can’t say it’s all due to too much protein, or too much calcium. It’s a combination of the ways nutrients interact with each other,” says Porr. When you overfeed any nutrient, you are more apt to upset the balance, and may have problems such as epiphysitis and DOD (Developmental Orthopedic Disease).

How The Body Uses Protein

"When the horse consumes protein, it is in a very complex molecule. The digestive tract breaks it down into the amino acids, or very short chains of amino acids (two and three amino acids long), so it can be absorbed. The amino acids are delivered into the bloodstream and ultimately travel throughout the body. Depending on which tissues need which amino acids, they are picked up out of the bloodstream where needed," says Porr. The various amino acids are used to synthesize muscle tissue, hormones, or whatever, and arranged in the form needed to create these.

"Some amino acids are referred to as essential, or limiting, because these are the ones that tend to run out first. They are not as common in the feed. Lysine is the first limiting amino acid, because it tends to run out fastest, in the diet. If a protein is considered high quality, this means it provides more of those particular amino acids that run out quickly," she says.

"An essential amino acid is one that has to be provided in the diet, because the body does not make it. A non-essential amino acid is one that the body can create from other pieces, or by conversion of other amino acids. When talking about protein quality, soybean meal tends to be a very high quality protein, because it contains more of the essential amino acids like lysine, that can be limiting in the horse's diet," says Porr.


"Depending on the quality of the protein, the body will break it down and absorb the amino acids, and different tissues will use the ones they need—to produce whatever they are making. If a tissue runs out of a certain amino acid it needs, that synthesis stops. It can't substitute another amino acid. The process must wait until it gets the amino acid it needs, or it may break the whole thing back down and put all the pieces back out into the system because it can't finish it's job." For a growing animal, this means growth will slow or stop until the essential amino acids are supplied.

"If the horse eats extra protein that is not used by the body, it is broken down. The body can take the carbons and use them to build fat, and excretes the nitrogen. It ends up as ammonia in the urine, and is wasted on the ground. The term 'you are pissing your money away' is very true!" she says.

"One old myth is that high protein diet causes kidney damage, but it doesn't.

The horse must urinate more to excrete the excess. He can't store protein, so if he has extra, it must be broken down and excreted. He must get rid of the extra nitrogen, which forms urea and ammonia. So when he eats extra protein, his urine will contain more of these by-products. He will drink more water, break down the extra amino acids, excrete them in urine, urinate more, and the urine will smell worse," she explains.

"In a healthy horse, as long as he has access to plenty of water, he won't suffer kidney damage from this process. In an older horse that already has compromised kidney function, a high protein diet can be a problem. Protein doesn't cause it—it just makes it worse. He has trouble filtering and excreting it."



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