A Philosophy of Nutrition

A horse cannot be fed everything it needs to be a horse!

by REX A. EWING

As anyone who has ever tried to stay atop a rank colt on a bad day can painfully verify, pound for pound, the horse is one of the strongest animals on earth. During a mile-and-a-half race, a horse will burn up enough energy to bring a 55-gallon drum of water from room temperature to a boil. Its heart will pump blood faster than a good stock well can deliver water—enough to fill an enviable jacuzzi to overflowing. The water its body loses in two-and-a-half minutes could support a human stranded in the hottest desert for four days.

What is the source of this tremendous energy? The answer, though obvious, is none the less surprising: Feed (and a little sunlight), and nothing more. Genetics and training play a large part in the outcome of the performance, but without the energy and tissues de- rived from the horse's diet, there wouldn't be any performance at all.

What are the processes that change common, agricultural products into compellingly uncommon equine performances? Once eaten, what happens to horse feed?

If converted to music, the biological symphony performed by the body of a healthy horse would give J.S. Bach, himself, goose bumps. In its labyrinthine course through the body, the hay, oats and supplements we feed our horses every day are converted into thousands of compounds: sugars and fats, acids, alcohols and proteins, just to cover a few of the broad categories. These, in turn, are used for three basic purposes: (1) to make new horseflesh, (2) to rid the body of wastes, toxins and spent horseflesh, and (3) to provide the horse mobility. The latter, aside from driving a multi-billion dollar industry, serves the horse two related purposes. It enables it to find more food to continue to cycle and, at the same time, allows it to avoid becoming part of a similar cycle in a different animal, such as a mountain lion or a wild dog.

The process that drives the body engine is metabolism, and molecular transformations are the force behind it. Molecules, by nature, are chemical creatures and, on the lowest level, all energy available to a horse begins as chemical energy. This, through myriad processes, is later converted into other forms of energy: electrical energy (for such important functions as signaling the heart to beat), potential energy (stored reserves in the tissues, such as glycogen), kinetic energy (energy of motion), and heat energy (an unavoidable by-product of chemical interaction, but necessary to maintain a constant body temperature).

When a molecule (say, the sugar, glucose, for instance) is broken apart, the energy of the bond that held it together becomes available for other purposes within the body. When we say energy is "burned," what we really mean is that a complex molecule is broken down into its constituents and the energy of the molecular bonds is liberated for use by the cell.

The small compounds from which the sugar was made are removed from the body as waste. Since some of the energy of the chemical bond was given up as heat, the energy required to form the pieces back into sugar again would exceed the energy obtained from breaking the bonds in the first place. To do so would create a net energy loss, and in nature (as in non-government economics) that's not an efficient way to go about things. The only recourse open to the horse

is to seek out (or to be fed) organisms more adept at the fine art of making sugars, namely plants.

But clearly a horse cannot be fed everything it needs to be a horse. The only thing in nature capable of making the stuff horses are made of is a horse. There is no hay available with horse DNA, nor do oats come pre-packaged with horse hormones (even if they are called horse oats). So, in addition to rendering, there is a great deal of manufacturing involved in the creation and maintenance of a horse. Plant proteins are broken down in the gut, formed into amino acids and then assembled into horse RNA, horse DNA, and horse proteins. In plantlike fashion, ergosterol reacts with sunlight under the skin to form Vitamin D. All the various hormones, controlling everything from growth, to heart rate, to estrus, are of local fabrication.

The short version of the story is this: the ceaseless process of the breaking and making of chemical bonds is only possible because of what the horse eats. And while, in light of this discussion, feeding our horses may seem like an awesome responsibility, we have to remind ourselves that horses made out pretty well on their own for many thousands of years before anyone was around to feed them.

On the other hand, horses of the past generally were not required to run a mile-and-a-half in two-and-a-half minutes (with 125 pounds of extraneous mass strapped to their backs), nor would a horse from the past, of its own volition, have opted to go 100 miles over treacherous terrain in the course of a single day.

We make demands of our horses that nature never intended. For centuries, we have genetically molded them to our ends, and yet continue to feed them foodstuffs produced on soils depleted of the minerals and nutrients prevalent in the native plains where the ancestral herds lived.

Where do we go from here? Should we continue to breed more speed and endurance into our horses? Yes; but it's important to realize that some day we will reach the juncture where we can no longer improve our horses by selective breeding. Sooner or later, no matter how clever we are at match-making, we will run into the cold, unyielding laws of physics, the laws that set the speed limit for any creature of a given size and design. There is, in fact, mounting evidence that, for certain types of horses, the point has been, or soon will be, reached.

But for most of us that day is a long way off. The horse industry is highly stratified. It's a caste system we have to buy our way into: good genes command good money. The vast majority of horses in the world are a long way from reaching the pinnacle of equine perfection, and most horsemen are reluctant to buy the genes to get there.

There may, however, be a cost effective way to get a little closer. By most estimates, a horse's performance is one-third genetics, one-third training, and one-third nutrition. In terms of dollars and time, nutrition is the most accessible of the three. In other words, a horse that does good on hay and oats can do measurably better with the proper extras in its diet.

Of course, good nutrition can't transform a cow-hocked, sway-backed aberration of nature into a Kentucky Derby winner, but it will enable a small horse at birth to grow considerably larger than it would have, unassisted. The right feeding program will correct a number of pathological conditions, from epiphysitis to cracked hooves, to uncontrollable nervousness, to infertility. And good, sound nutrition will get as much out of our horses as they (by training and genetics) have to give.