



Every rider wants controllable energy from their horse.....



all about energy



The one thing that every rider wants is controllable energy from their horse. Too much energy and the rider is exhausted trying to contain the horse, too little and the horse may struggle to do the work being asked of him. Finding the balance is quite simply the key to success so it is no wonder that manufacturers use terms like “sparkle without fizz” and “non-heating” to entice riders into buying their feeds. But what does all the jargon mean?

What is Energy?

There are several forms of energy, including heat energy, light energy, chemical energy and kinetic energy (movement). In terms of the “energy content” of feed, we are talking about the conversion of chemical energy into kinetic energy when the horse works. In food, energy is trapped in bonds between molecules and is released when the food is digested and the bonds are broken. The conversion of energy from food into a form the horse can utilise for work is termed metabolism.

There are lots of different metabolic pathways that the horse can utilise to produce energy. These are influenced by factors, including the form in which energy is provided in the diet and the intensity of the work the horse is doing, but the overall end product of metabolism is ATP (adenosine triphosphate) - the source of energy that the body utilises. The horse does store some ATP in its muscles but only sufficient to support a few seconds of exercise. After that is used up he has to source energy elsewhere.

Where Does Energy Come From?

Sources of energy which the horse can use are fibre, fat, carbohydrate and, to a lesser extent, protein. Protein is only used as an energy source when it receives more in its diet that it requires for building and repairing muscle and other body tissues. This, however, is not an efficient process as it requires the horse to take in more water (not ideal when a performance horse already has significantly increased water requirements) and results in the increased production of urea. This can have an adverse effect before it is excreted with the obvious threat to the respiratory system from ammonia once urine is exposed to air.

The energy sources that we are primarily concerned with are, therefore, fibre, fats and carbohydrates. The amount of energy a feed is able to deliver is measured in Mega Joules per Kilogrammes (MJ/kg) and known as the Digestible Energy (DE) content of a feed. Since

human food has for so long had its energy level measured in Calories, this is a term which may have more meaning and is often used when referring to feed energy for the equine.

Fibre

Fibre is said to be a slow-release energy source which is largely because the structure of fibre is complex and it takes longer for the bonds between the molecules to be broken. The horse relies on a population of micro-organisms that interact with one another to break down fibre. There are different types of fibre, some of which are more easily broken down than others and this greatly affects their value to the horse.

Lignin is an indigestible material that plants use to give themselves greater structure and support as they mature. Because lignin is indigestible, the more lignin the fibre contains the less use it is to the horse, which is why fibres, such as straw and late cut hay provide less energy than sugar beet or soya-hulls – so called “super” fibres.

Those fibres which are “digestible” are actually broken down in the hindgut, on the horse’s behalf, by a population of bacteria which ferment the fibre so that it breaks down into free fatty acids. These can then be absorbed into the blood stream and used to provide energy. Because this process takes some hours, energy obtained from fibre in the diet, is known as “slow release”.



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Fat = Oil

Nutritional fat is generally supplied in the equine diet by oils and, while the horse's natural diet doesn't contain very much oil, the horse is actually able to utilise it relatively efficiently. Oil contains lots of calories – about 2.25 times more than carbohydrates provide – which is advantageous for the horse as it means that only a small volume is required to provide lots of calories. Again, because the process of digesting and metabolising the oil, takes some time, it is also referred to as a “slow release” energy source.

Oil is an energy source that can be utilised when the horse is working at low intensities. This means that the body can save valuable stores of glycogen, the storage form of glucose, to use when the intensity of work increases. This is referred to as a 'glycogen sparing effect' and is useful for improving stamina.

When a horse is working at low intensities he is said to be working aerobically - there is sufficient oxygen available to break down energy. However, at high intensities, the horse moves into anaerobic respiration (without oxygen) and can only use glucose or glycogen to produce ATP. There are considerable differences between the efficiency of aerobic and anaerobic respiration.

For example anaerobic respiration provides energy rapidly but only for a limited amount of time. It also only produces 3 molecules of ATP per molecule of glycogen or 2 ATP from 1 molecule of glucose whereas aerobic pathways produce about 13 times more ATP.

Carbohydrate

Carbohydrate, mainly starch, is provided in the equine diet by cereal grains. Starch is made up of long chains of glucose (sugar) molecules and is used by plants as a form of stored energy in seeds (grain) so that, when the seed germinates, there is a source of food energy to help the seedling grow. Other sugars and carbohydrates are supplied but forage and other elements of the diet and are digested and absorbed by the small intestine.

Digestion breaks the starch molecule down into separate glucose molecules which are absorbed straight in to the blood stream in the small intestine. Cereals are therefore known for supplying “quick release” energy as they are easily digested and glucose is able to be used by the muscles and other organs and tissues, straight away. Indeed, glucose is the only energy source used by the brain and other organs so some sugars and starches are essential in the diet of performance horses who need to concentrate for long periods of time.

Feeding “Carbs”

The horse's stomach is of limited capacity and not very stretchy so, if meals containing cereals are too large, undigested starch can be passed on out of the stomach and small intestine onto the hindgut (large intestine). Here it can disrupt the resident bacterial population, responsible for fibre digestion, leading to potential problems, from discomfort, causing crabby behavior or colic, to metabolic issues, including tying-up or laminitis. There are simple ways to reduce the risk of the problems associated with cereals occurring.

The basic rules of feeding are a good place to start, with feeding little and often probably the most important. When you select a feed for your horse always check that it includes cereals that have been cooked as this improves their digestibility - just as you wouldn't eat raw potatoes or pasta, the horse shouldn't be eating raw cereals. Oats are difficult to cook because of their high fibre content but the energy they contain is more readily available anyway. In comparison, other cereals such as wheat, barley and maize should all be cooked.

There are several cooking techniques that can be used, including micronisation and extrusion. Research has shown that micronisation is the most effective cooking technique as it increases the amount of starch absorbed in the small intestine more than other cooking techniques thus helping stop too much starch reaching the sensitive hind gut.

Ask any chef the secret to producing good food and they will all highlight the importance of top quality ingredients which, combined with knowing how to cook those ingredients at the correct temperature for the right amount of time, is the difference between junk food and cordon bleu cuisine. And, it's just the same for horse feed. Baileys have spent many years establishing optimum cooking times and temperatures for the ingredients they use to ensure that the finished feed is both palatable and highly digestible.



I WANT MORE SPARKLE...

If your horse needs more sparkle then you probably need to try an oat-based ration such as Baileys No.9 All-Round Competition Mix. Alternatively, if your horse is a good-doer, you could try a low calorie balancer, like Lo-Cal, and add straight oats which gives you the flexibility to adjust the level of energy whilst maintaining a balanced diet.

I WANT MORE STAMINA...

To promote stamina, we usually look to fibre and oil as our main energy sources which is why we developed Baileys No.6 All-Round Endurance Mix, an advanced formula with alfalfa, 'super-fibres', quality protein and chelated minerals. Alternatively, you could add a concentrated oil source, like Baileys Outshine, to your horse's existing balanced diet to provide additional energy in a non-heating form without vastly increasing the volume fed.



For further information or a practical and individual diet for your horse, contact one of Baileys Nutrition team on 01371 850 247 (option 2) e: nutrition@baileyshorsefeeds.co.uk www.baileyshorsefeeds.co.uk