

Director's Digest



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ATHLETE - USING FATS TO IMPROVE THE PERFORMANCE OF RACEHORSES

H. Roger Hatch , BP Nutrition (UK)

COMMENT: This article appeared in Issue Two 1992 of the Oils and Fats International Magazine. The UK author indicates soy beans and soybean oil are used as added fat sources in the UK product, but animal fat is the fat of choice in most U. S. horse feeds.

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H. Roger Hatch BP Nutrition (UK) , trading as Triple Crown, tells how it is possible to produce a horse feed containing 15 percent fat.

How many times do we hear of incidents where a new horse is introduced and begins to race really well, hopes rise, there are congratulations all around - and then, after a few months, he appears not so willing to work, performance goes off and he shows more and more signs of fatigue. Nutrition may be the answer, even though there are no signs that the animal is off its food.

With race horses in particular, and other endurance animals too, sustainable performance can be an elusive goal. Research has shown that in the case of race-horses provision of a high level of fats in the diet, in the right form for optimum digestibility, can be the answer.

To see why, we have to look into the way in which horses obtain the energy supply they need for sustained effort. Energy is provided by the digestion of protein, starch and sugars, fats and fibre (since the horse can effectively digest cellulose) "performance fuel" availability is mainly provided by the digestion of starches, sugars and fat.

Under fully aerobic conditions (i.e. with plenty of oxygen supply to the muscles), glycogen is available immediately for conversion into energy for work. But the animal's glycogen reserve can run out, and then anaerobic metabolism takes over, and - with the build up of lactic acid - the onset of fatigue begins.

The key to breaking through this limitation is to unlock the availability of energy from fat as early as possible. In this way, the glycogen reserve level can be kept up (until a late stage in a race, for example). Although this sounds simple enough, there are a number of obstacles still to overcome. First horses must be trained on high levels of fat, in order to improve the metabolic pathways for fat utilization. Secondly, it is not always easy to feed fat to horses, since they can be rather discerning about what they eat.

Normal equine diets contain very little fat, most of which is indigestible. The table compares fat contents and availability for a range of feed ingredients for horses.

ELEVATING DIETARY FAT IN EQUINE RATIONS

Considering the horse evolved without a gall bladder and is essentially a herbivore, it comes as a surprise to know that its digestive system can deal very efficiently with dietary fat and oils. Such utilisation can lead to a marked improvement in performance, and the time taken to recover from strenuous exercise.

With the mechanization of the Army and the demise of the Service Veterinarians, whose job it was to advise the Army Council on the feeding of the horse, the potential benefits of dietary fat to the equine species received little attention, until researchers started to look again at this source of energy in performance horse diets some fifteen years ago. Since then, much work has been done by a variety of researchers world wide; and the fact that they are in almost unanimous agreement as to the benefits of dietary fat now compels serious horse owners to start including elevated levels in their horses' diets.

Fats, oils, gums and waxes, collectively categorized as lipids, consists of esters of fatty acids and glycerol; hence they are often referred to as triglycerides. There are fourteen or so fatty acids that appear in varying combinations within a particular lipid. As with amino acids within protein, these building blocks are separated out during digestion and then reconstituted into a different combination, more suitable to be laid down as equine fat reserves or burnt off for immediate energy use. Such a process presupposes that dietary fat can be digested by the horse - for as with protein and carbohydrates varying proportions, depending upon the source, of lipids are unavailable to the horse and pass through to form part of the faeces.

As a general rule the higher the level of fats or oils in the feed the higher the digestibility. For instance what little fats there are in hay is virtually unavailable to the horse; digestibility trials indicate coefficients of no more than 30 percent,

and with poor hay down to less than 10 percent. This is due to the preponderance of indigestible waxes. On the other hand the digestibility coefficient of processed oil sources, where only the finer oils have been taken off, can be virtually 100 percent.

The criteria for a good source of dietary fat and oil for the horse is one that is firstly highly digestible and secondly reflects the spectrum of individual fatty acids as required by the horse. Several other important aspects need also to be considered when elevating the levels of dietary fat. Fats and oils should always be in their whole state and not, through rancidity, have started to be broken down into their constituent free fatty acids.

Luckily, the horse's advanced sense of smell and taste usually precludes consumption of feeds where rancidity has rendered the feed more than just stale. However, unstable fats just beginning to oxidize can, within a sluggish digestion, start to give off toxins with deleterious effect.

To avoid this occurrence, fats and oils added to the diet should always be stabilized i.e. treated to destroy enzymes that in the presence of oxygen can start compound breakdown. As an adjunct to this, it is prudent to add extra levels of tocopherols (vitamin E) to the diet, to act in their capacity as metabolic antioxidants.

Another point of consideration is how dietary fat presents itself for digestion in the gastro intestinal tract. Large amounts of free oil fed directly can be squeezed through the small intestine by peristaltic action ahead of other feeds, re-

sulting in less than optimum absorption; and if continually fed may partially smother the beneficial cellulotic bacteria and protozoa in the hind gut. Due to the possibilities of this, its best to insure that intracellular dietary fat is fed to horses (i.e. fat held homogeneously within the monocular structure of the carbohydrates and proteins) so that it presents itself at the site of digestion in unison with other nutrients. High levels of dietary fat should also be accompanied by increased levels of lecithin, nature's own emulsifier. Lecithin is important in the conveyancing and distribution of fats in the metabolism.

Fat metabolism involves the presence of carbohydrates and proteins, and therefore cannot be considered in isolation within the diet. Further research is needed on the exact ratios between them for varying athletic disciplines. However, a dietary fat level of some 5 percent in the total diet will show positive results.

Besides the important aspect of being able to add extra calories to the ration without incurring dietary displacement, research scientists have stumbled on another significant benefit, hitherto not considered. This is that horses trained on higher levels of digestible fat begin to utilize it more readily during activity thus sparing limited reserves of muscle glycogen. This valuable sparing effect leaves more "in the tank" for the home straight. Also, horses develop a calmer temperament and better mental attitude when a greater proportion of their daily calorie intake is derived from dietary fat. Therefore non-productive

circulation and burning of energy due to stress is reduced.

A reliable proven way of adding high quality stabilized intracellular fats to the diet of performance horses is to use Athlete, a high fat processed feed developed by BP Nutrition / Purina Mills, and recently introduced into Europe following several years of commercial success in the United States. This highly successful feed containing extra levels of vitamin E and other performance related nutrients also gets over the hurdle of palatability, often a stumbling block. Athlete attends to all the necessary criteria of feeding high levels of fat to horses in one convenient addition to the daily diet.

ATHLETE

Athlete has been developed after many years of research, development and trial, chiefly by Purina Mills Inc. in the United States, to enhance the ability of horses to perform with increased physical activity. It does so by the infusion of highly digestible, unsaturated fat into carbohydrate and protein rich structures. This effective formula ensures the horse derives more energy by metabolizing fat, using less glucose, sparing glycogen and reducing the production of potentially toxic lactic acids. Not only this, but it is highly palatable, even to the extent of being made in the form of grain shaped extrudates.

The product is made from soya beans, with added soya bean oil, together with a cereal base. In fact, it contains 15 percent fat and 15 percent protein, in addition to vitamins, micronutrients and

fibre, and nothing as high in energy has ever been made for horses.

It can be truly said that the development and introduction of Athlete is a tribute to the advance in modern animal nutrition technology. The reason why we have not increased fats in the diets of horses before is that firstly we did not know we could and secondly we did not have the technology to manufacture a product like Athlete.

FAT LEVELS IN EQUINE FEED

FEED	ETHER EXTRACT	DIGESTABILITY	COMMENTS	DIGESTIBLE FAT GRM/KG
HAY	0.5 - 3.0%	18 - 33%	Poor source	1 - 10
DRIED GRASS/ LUCERNE	1.8 - 6.0%	20 - 33%	Low source	5 - 12
UNCLIPPED/ CLIPPED OATS	1.8 - 6.0%	67%	Good source	12 - 40
NAKED OATS	7.5 - 9.0%	67%	Good source but tendency to be unstable	50 - 60
SUGAR BEET PULP	0.5%	0%	Does not contribute fat	0
BARLEY	1.5%	35%	Low level of available fat	5
MAIZE	3.5%	59%	Moderate source	21
BRAN	4.0%	48%	Moderate source	19
SWEETFEED/ CUBES	2 - 4%	20 - 50%	Variable Availability	4 - 20
ATHLETE	15%	90%	Highly available source of stabilised fat	135



