FEEDING FOR COMPETITION

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Feeding horses above their requirements cannot improve performance beyond natural ability. Neither will giving supplements to poorly conditioned horses improve performance. However, if feeding is inadequate or the is diet unbalanced, performance will be far less than what could be achieved. In addition, certain diet manipulations have been shown to assist in delaying the onset of fatigue - reducing the risk of injury and allowing horses to maintain top speed for longer.

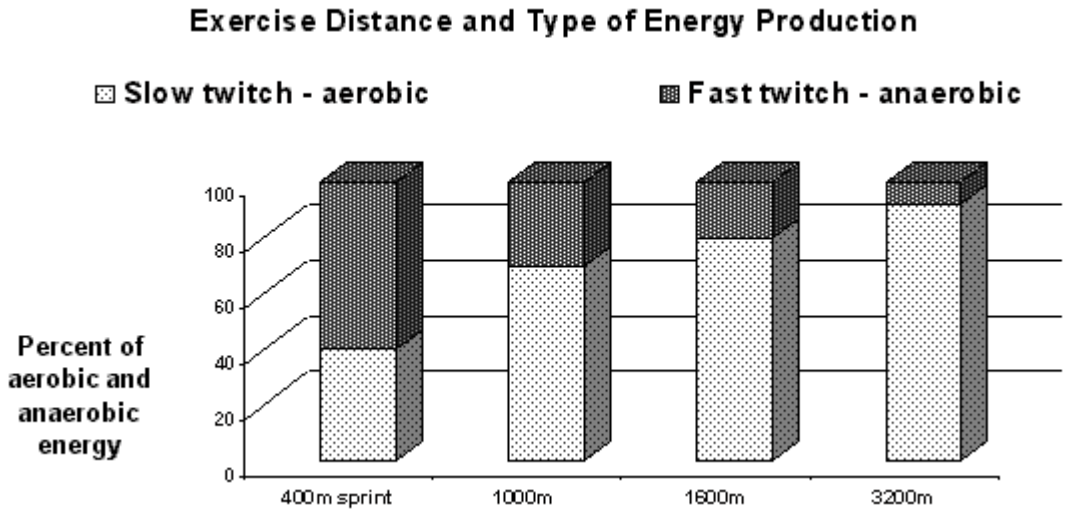
Competition for Quarter horses includes racing, reining, cutting, campdrafting, rodeo, western pleasure, futurity, showing and halter. The requirements of each discipline vary. Each pursuit is too vast a topic to compress into a small space and cover in the detail deserved. So the more physically demanding activities will be explored, because the risk of fatigue, poor performance and injury is higher and nutrient requirements are greater.

Fatigue : is bought on by falling blood glucose levels and rising lactic acid levels - both of which reduce muscle function. As muscles tire, they are less able to support tendons and ligaments. This adds extra load onto joints and bones - increasing the likelihood of falls, fractures and other injuries. If we feed to increase energy, we can delay the onset of fatigue - because the horse will not have to rely so heavily on the processes that herald the onset of fatigue. Feeding strategies should increase blood and muscle glucose and minimise heat production.

Energy : During low intensity work, muscles convert glucose to energy using oxygen - this is called aerobic work. Aerobic work can be sustained for long periods.

During high intensity exercise, the muscles use energy so quickly that aerobic energy supply is exceeded and glucose must be converted to energy without using oxygen. This is called anaerobic work. Anaerobic work can only be sustained for a very short period and results in lactic acid production.

Aerobic energy production does not stop when anaerobic energy processes begin. The graph below shows that aerobic processes continue - and still provide the majority of muscle energy - even at top speed. Anaerobic energy serves to 'top up' aerobic supply.



The intensity of exercise at anaerobic processes begin, depends on nutritional status, fitness, prior training, warm-up and rate of increase in speed. As a rule of thumb in the fit horse, anaerobic work starts to kick in when speed reaches approximately 10 metres per second and heart rate reaches around 160 to 180 beats per minute.

Sports such as cutting and reining involve both low-intensity work (aerobic exercise) and phases in which energy demands are greater and necessitate anaerobic energy production. Reining horses have an intense demand for

energy during training and performance, particularly as 3 year olds when they undergo training for futurities. They may become depleted of energy or enter a state of oxygen insufficiency which can lead fatigue, poor performance and injuries. When this happens, the horse will start a reining pattern strongly and then fail to perform the last couple of manoeuvres correctly. These horses benefit from a high-energy diet similar to that required by racing and cutting horses.

While loping circles, reining horses are working aerobically, that is, they can generate energy using oxygen. However, during galloping, spinning and stopping, heart rates increase to up to 200 beats per minute and they are working anaerobically.

It is important to monitor fatigue in the reining horse. The parameter most easily measured is heart rate and the goal of daily training is to perform all manoeuvres while avoiding fatigue. If the heart rate fails to recover between manoeuvres then the session should be ended as a physiological endpoint has been reached. Some manoeuvres require more rest between repetitions than others if precision and exactness in execution is to be achieved.

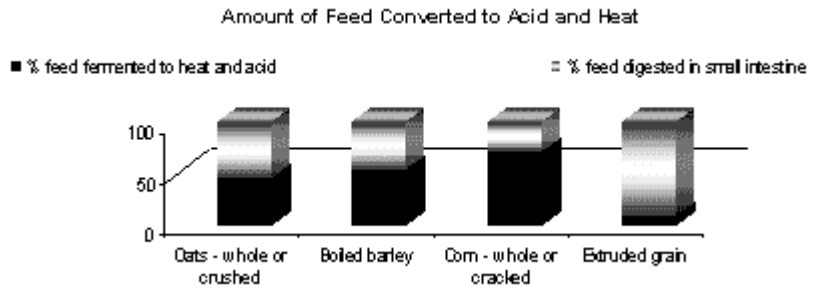
The racing Quarter horse must deliver speed over distances ranging from 200 to 700m. Their success depends on anaerobic fitness, lactic acid tolerance, muscle fuel storage, finely tuned coordination and efficient stride. Lactic acid probably not a factor in less than 400m. At 870 or longer, lactic acid is involved in fatigue.

A study of 53 racing QH found that bone mineral content is lowest on day 62 of training - just when speed work is introduced. The reduction in bone mineral content is due to resortpion of bone mineral which results from bone remodelling associated with the early stages of training. By day 104 density has increased. Bone mineral content is often at its lowest at a point in a horses training when speed is being introduced. This is thought to be one of the factors involved in the high injury rates seen in young race horses.

Large numbers of racehorses have their careers halted or negatively altered due to performance related injuries. Due to financial pressures on trainers and owners racehorses often begin their training and conditioning before reaching two years of age. Since maximum mineral content in the cannon bone may not be reached until 6 years of age there is enormous potential for skeletal injury in the young horse.

Heat' also contributes to fatigue. As shown below, heat from working muscles, the environment and internal metabolism combine to raise the horse's body temperature and cause sweating. To cool itself by sweating, the horse must divert blood away from the working muscles, and send it to the skin. This reduces muscle blood flow such that oxygen and glucose levels fall and acid levels rise - hastening the onset of fatigue. Sponging with cold water before and after exercise reduces the heat load. The heat produced by working muscles can be reduced by feeding highly digestible, high oil diets and reducing the amount of protein. To reduce heat produced during metabolism, we need to reduce the amount of fermentation in the hindgut. This is achieved by using feeds that are highly digestible in the small intestine.

The graph below shows how much feed energy is converted to waste heat during digestion - adding to heat load and reducing the energy available for working muscles.



Oil: Using high oil feeds offers enormous benefits for temperament, heat load and performance. To achieve these benefits, the diet must contain 10 - 12% oil. Oil provides a cool and steady supply of energy - allowing the horse to preserve blood glucose levels.

This 'glucose-sparing' effect delays the onset of fatigue, so that although horses cannot increase their top speed, they can maintain it for longer. QH doing cutting horses adapt to a fat-supplemented diet within 14 days, but it takes up to 28 days for muscle fuel stores to increase and be available for exercise. ie CHO-sparing effect. To receive the benefits of reduced fatigue, or fatigue related injuries to cutting horses a fat-supplemented diet should be fed for at least 28 days prior to a strenuous event.

Protein: If protein intake is above requirements, the extra protein is converted to energy. Ammonia and urea are the waste products of protein metabolism and together they increase water requirements and ammonia levels. Ammonia and urea cause respiratory irritation, increased risk of gastrointestinal diseases, nervous irritability and disturbances to energy production - all of which impact adversely on performance, temperament and susceptibility to respiratory and digestive disturbances. Studies in Quarter horses have shown that protein should not exceed 1600grams per day.

Glycogen loading: Several studies have shown that muscle glucose can be increased by dietary manipulation - a bout of intense exercise, followed by an increase the amount of grain. Grains are excellent sources of energy, but high intakes of raw grain predispose to laminitis, colic, diarrhoea, endotoxeamia and 'tying up'.

If high levels of raw grain are fed, the digestive capacity of the small intestine is quickly overloaded and undigested starch passes to the caecum, or hindgut, where it ferments yielding gas, lactic acid and heat (as shown in the chart above). Grain and complete feeds processed by wet-extrusion are recommended to reduce heat load and for horses needing high energy intakes. They have also been shown to protect against 'tying up', laminitis, colic, diarrhoea and behavioural problems.

Roughage: Weight handicap or fluid and electrolyte reservoir? By altering the amount of roughage, we can alter both the composition and weight of the gut contents. The principles are that each kg of roughage holds 6 - 8kg of water and electrolytes in the gut. Such a reservoir of water and electrolytes can be drawn on as body fluid levels drop during sweating. This can be an enormous advantage during the roads and tracks when dehydration and electrolyte imbalances contribute to fatigue. However, during racing, this extra weight from gut 'ballast' presents the horse with an added load to carry. Thus, roughage intake can be reduced to 0.75% of bodyweight for several days before racing to reduce weight handicap. Studies in America have shown improved performance times in Quarter horses who ate a lower amount of highly digestible, energy-dense, oil-enriched feed, than those on traditional unprocessed raw feed. This improvement was attributed to lower gut ballast.

Time of Feeding: High concentrate meals should be fed no less than 4 hours before competition. Blood glucose levels are lowest 90 minutes after feeding. If exercising at this time, fatigue comes on sooner due to low blood glucose.

Body weight: All athletes, whether human or equine, have an optimum or ideal body weight for peak performance. Therefore the skill of the rider and their understanding of each individual horse is of primary importance. Where possible horses should be weighed and a record kept of performance to determine the optimum body condition for best performance. The higher the desired level of performance, the narrower the margin for error and horses should be maintained within 10kg of their optimum weight.

Hyperkalaemic periodic paralysis - a low potassium diet or a higher potassium diet fed in multiple meals lessens the occurrence and severity of episodes and might make disorder manageable.

Veterinary research consistently shows that what is in the feedbin can adversely affect both health and performance. Steam Extruded feeds and oils offer significant advantages in preventing veterinary emergencies and improving performance. By applying basic feeding principles that have stood the test of time, with the most up-to-date international sports science and equine nutrition research, the equine veterinarians at Mitavite have formulated fully steam extruded concentrates and complete feeds specifically for the competition horse. By combining steam extrusion with high added oil levels Mitavite performance feeds offer the safest and 'coolest' way to provide a high energy intake and meet all vitamin, mineral and electrolyte demands - without adversely affecting performance, health or temperament.