

**POWER-TO-WEIGHT RATIO©**  
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At the gallop, the racehorse inhales over 1600 litres of air per minute; blood diverts from the digestive system to increase the supply to the muscles by 70 fold; heart rate soars from a resting 30, to 220-240 beats per minute; force through the cannon bone and tendons increases to 4500 kg and stride lengthens to cover over 16 metres per second.

In producing this effort, the racehorse consumes more than twice as much oxygen per kg of body weight as an elite human athlete and performance may be limited by the efficiency with which the lungs and blood can deliver oxygen to the working muscles. When using oxygen to drive the energy cycle, the racehorse has enough power to maintain a speed of 12 metres per second, but the average speed in races such as the Arc de Triomphe is closer to 17 metres per second. For the additional speed which provides the powerful spring from the barriers and the brilliant finish that characterises superior performance, the horse uses a second high energy fuel source which is stored in the muscles. However, this energy supply is short-lived.

Of the energy generated by the contracting muscles 75% is lost as waste heat. If performance is not to be limited by rising temperature, the horse requires an efficient cooling system. The skin fulfils this role, however, the diversion of blood from the working muscles to the skin, contributes to the onset of fatigue. In hot, humid climates these problems are greatly increased.

The effectiveness of the diet is measured in terms of metabolic efficiency, ie the maximum output with the minimum production of undesirable products such as manure, acid and heat. To increase power for work, diets need to be designed to influence muscle fuel levels. But the feed chosen also influences the power:weight ratio (ratio of muscle to fat), thermoregulation (heat production and hydration) and mental attitude – all of which impact on performance and fatigue.

Oil-enriched diets reduce the amount of metabolic heat generation, both at rest and during exercise and for the thoroughbred training and racing in hot, humid climates, this reduction in heat load can provide a competitive edge. For both digestive and metabolic efficiency, oil is superior to carbohydrate and protein. The lower heat load lessens the need for sweating, reducing fluid loss during exercise. Studies have traditionally shown that oil-enriched diets affect working muscles by increasing oxygen uptake, increasing fatty acid utilization, sparing muscle glycogen during low intensity exercise and increasing glucose availability during intense sprinting exercise.

Fat supplementation also reduces heat production, improves hydration and perhaps most importantly, diminishes gut ballast and improves the power:weight ratio. And, calmness, as measured by spontaneous activity and reactivity (spook tests), is lower when diets are fortified with oil.

As well as a sound daily nutrition program, the composition and timing of pre- and post work feeding impacts profoundly on the development of muscle power. We all understand the link between diet and body condition in humans: want to lose weight – reduce the carbohydrates (bread, pasta, potatoes etc), need to gain muscle – increase the protein. It is no different in the horse, except that carbohydrate = grain, while protein = vegetable protein meals and lucerne. To achieve a more athletic body condition, protein intake should be increased

immediately before work and to increase energy, carbohydrates should be fed immediately after work.

To support the development of muscle strength and power, the feed must address two issues: glycogen repletion (ie fuel replacement) and protein replacement. By supplying the correct balance of carbohydrate, specific essential amino acids and anti-oxidants after an intense workout, it is possible to switch the catabolic state into an anabolic (ie rebuilding of tissue) state, enabling muscles to recover and respond more quickly to training and competition.

Nutrition is a powerful tool when used properly. Many traditional feeding practices developed in the colder northern hemisphere last century, are not appropriate in the hotter southern hemisphere climates. MITAVITE XLR8 has been carefully balanced to provide the oils, protein, energy and anti-oxidants essential for superior performance in Australian conditions. Increased amino acid release from steam-extruded feeds gives more control over the power-to-weight ratio and ultimate body composition, while improved carbohydrate digestibility makes feeding energy safer. Although genetics ultimately sets the limit to performance, how closely a horse approaches that limit, is determined by training and nutrition.