

Feeding in a Hot Climate

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When horses exercise, 75% of the energy used by the muscles is converted to heat. Working at 13 metres per second for 2 minutes, a horse generates enough heat to bring 8 litres of water to the boil. Sweating gets rid of 65% of the heat load and 25% is dissipated through the lungs.

Further complicating the process is competition for bloodflow. To produce sweat the horse must divert blood away from the working muscles and send it to the skin. This reduces blood flow to the muscles and causes horses to lose speed and power. The amount of sweating is related to speed, duration of exercise, fitness and climate. In tropical climates horses must produce twice as much sweat. The increased sweating increases fluid and electrolyte losses. If fluid and electrolytes are not replaced, the amount of blood in the body is reduced and the blood becomes thicker. Both of these factors reduce performance.

The amount of body fluid lost during work can be obtained by measuring pre- and post- exercise body weight. Horses can only sweat at a significant level if they have plenty of body fluid. Even mild dehydration - brought on by the loss of 4 - 5kg of fluid, reduces sweating and performance. Monitoring body weight as a measure of fluid loss is critical.

As well as fluid, sweat contains the electrolyte minerals: chloride, potassium, sodium, calcium and magnesium. Electrolytes are essential for muscle function, body fluid balance, kidney function, sweating and to regulate body acid levels.

There are 3 sources of heat acting on the exercising horse.

THE EXERCISING HORSE MUST COOL 3 TYPES OF HEAT

1. METABOLIC HEAT produced by food digestion This heat maintains normal body temperature

3. HOT WEATHER both METABOLIC and ENVIRONMENTAL heat act on the horse.

TOTAL HEAT
=
METABOLIC
HEAT



TOTAL HEAT
=
METABOLIC
+
ENVIRONMENT



TOTAL HEAT
=
METABOLIC
+
EXERCISE



TOTAL HEAT
=
METABOLIC
+
EXERCISE
+
ENVIRONMENT



2. EXERCISE generates heat from muscle contraction - only 25% of the energy generated by muscle contraction is available for work - 75% is converted to heat (a car has an energy conversion efficiency of only 15%)

4. EXERCISE IN HOT WEATHER All 3 sources of heat are acting on the horse which is exercising in hot and humid climates and increase the heat load the horse must cool

A diet that minimises *heat of digestion* will significantly reduce the heat burden.

Horses become 'dry coated' when they lose the ability to sweat. Other names for 'dry coated' are 'puffs' and 'anhidrosis'. The condition occurs in hot, humid regions of the world, including Australia, Singapore, Hong Kong, Macau, Malaysia and the southern USA. It is thought to be due to sweat gland exhaustion. However, these horses can be helped by reducing the heat load. Total heat load includes heat from the environment, heat from

the working muscles and heat produced during digestion. Certain feeding practices and management strategies can reduce the heat load that the horse must cool.

70% of the energy from roughage can be lost as heat, which is captured in the digestion process in the large intestine. To help minimize this heat production in hot climates it has been suggested to feed a higher proportion of dietary roughage in the evening when it is cooler and not throughout the day. Feeding hay in the evening after the last feed can assist in decreasing the heat produced.

Although roughage digestion produces a lot of heat, the level of roughage must be maintained at around 1% of body weight. Each kg of roughage holds around 6 to 8 litres of water and electrolytes in the gut and this acts as a reservoir, on which the horse can draw to replace sweat losses.

Steam extruded feeds and oil-enriched feeds produce the least amount of heat during digestion. 90% of steam-extruded feeds are digested in the small intestine compared to raw grains where only 21% of barley and 29% of corn and 65% of oats is digested in the small intestine, the balance is fermented in the large intestine producing additional heat on digestion. The incidence of 'tying up', heat stress and dry coated disease is reduced on feeds which reduce body heat production.

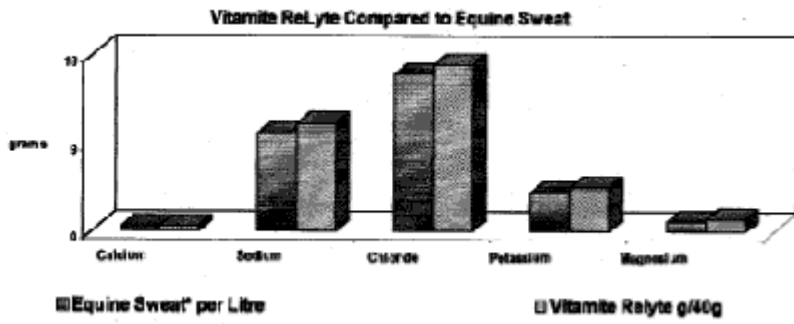
Feeding grains and complete feeds prepared using steam-extrusion and using specially formulated, oil-enriched racing feeds offer significant advantages for reducing heat production. For these reasons, MITAVITE produce a range of racing formulas, including Sustaina, Turbo Sustaina, XLR8 and Formula 3 which combine steam-extruded grains with natural, cold-pressed oils to increase digestibility and reduce the weight of feed required to meet the demands of training and racing in hot climates.

Oils are becoming increasingly popular as a high-density, cool energy source. They are also an excellent way to increase the weight of a horse. By providing a cool and steady supply of energy oils exert a 'glucose-sparing' effect, delaying the onset of fatigue so that although horses cannot increase their top speed, they can maintain it for longer. They are primarily digested in the small intestine and contain approximately 2-3 times more energy than the same weight of grain. Introduce the oil to the diet gradually over a 3-6 week period. Begin with 5-10ml a day and increase it gradually by 5ml a day until reaching the desired amount. Monitor manure during the changeover and if it becomes too soft, reduce the rate of oil increase.

Because of the abundance of Omega 6 in diets, it is important to provide an Omega 3 supplement. When Omega 3 oils are included in the diet, human athletes report less delayed muscle soreness, shortened recovery time, increased oxygen uptake and improved performance times. This is thought to be due to improved circulation, reduced blood pressure and increased flow through narrow capillaries in the lungs and muscles. A recent veterinary review article indicated that Omega 3 oils may be beneficial for treating colitis and enteritis, and in preventing arthritis, laminitis, small airway disease associated with stabling and dermatitis. All oils provide energy, only Omega 3 oils reduce inflammation. Mitavite has formulated a balanced blend of Omega 3 oils in Mitavite Performa 3 oil and 80-100ml a day corrects most dietary imbalances.

In hotter climates additional electrolytes may need to be fed to ensure the correct balance of electrolytes is maintained.

Most feeds do not contain enough electrolyte minerals. Horses competing in hot, humid conditions may require 250grams of electrolytes per day and, because the body cannot store electrolytes, daily administration is necessary. However, as well as the amount of electrolytes supplied each day, the balance is important. Excess calcium is linked to hormone, blood pressure and muscle problems. An excess of sodium will cause potassium to be lost in the urine. Vitavite Relyte has been formulated for heavy sweating horses working in tropical and subtropical conditions. The electrolytes and minerals are present in Relyte in the same ratios that are found in sweat.



Daily supplementation of a good quality diet is an effective method of replacing sweat losses. Analysis of the feed, monitoring body temperature and weight, combined with veterinary advice and blood testing provide the most accurate information so that intake matches requirements.