

Horses really suffer during extremely hot weather. The thermal neutral zone is a range of ambient temperatures where they are most comfortable and do the best. Horses' *thermal neutral zone* is lower than ours. We are most comfortable in the 50°-70° range, whereas horses are 20° to 30° lower. When any animal is within their thermal neutral zone they are more efficient at maintaining body temperature. When they are outside that zone they must burn more energy to warm themselves in cold weather or cool themselves in hot weather. So they feel better and operate better within that thermal neutral zone.

Heat that is generated during muscular activity is a problem in hot weather. The relative humidity also is a big factor. Lack of air movement can contribute to the problem also.

The horse produces a tremendous amount of heat during exercise. Within muscle, the conversion of stored energy (for example, glycogen) into mechanical work (muscle contraction) is very inefficient, resulting in heat accumulation. The rate of heat production is related to the work effort – the faster the horse runs, the greater the rate of heat production. Similarly, steep terrain, difficult footing, and weight carried (rider and tack) – all of which increase effort level – will increase the rate of heat production. At any given work level, the total amount of heat produced depends on the duration of the exercise.

Physical conditioning and heat acclimatization also influence tolerance to work in the heat. A poorly conditioned, overweight horse can be at high risk for overheating if worked too hard in hot conditions. For one, body fat acts as an insulator, impeding heat loss. Second, physical conditioning results in a number of adaptations that improve temperature regulation during exercise. With training, muscles work more efficiently and produce slightly less heat. The cardiovascular system is also better able to move heat from the site of production (muscle) to the skin. Training also increases the efficiency of sweating. Therefore, it is imperative that your horse undergo a training program that is appropriate for the work he will be doing.

Horses dissipate heat mainly by sweating (evaporative cooling) and they lose a lot of water and electrolytes. Horses exercising in hot weather can lose 2-4 gallons of water per hour. So their water and mineral consumption must increase to meet normal requirements, plus the losses that have

occurred as a result of performing during hot weather. Without adequate replacement of those losses a horse's performance will suffer, plus there can be dire medical consequences during or after exercise. A horse is composed of about 65% water. So a 1000 lb horse is carrying 650 lbs of water. This includes all the water in the digestive tract, the fluids in the vascular (blood circulation) system and that in the extravascular system (intracellular and interstitial). A loss of 15% water is fatal. Losses of 5 to 10% are serious and if not corrected can lead to problems. Horses at maintenance will drink 10 to 12 gallons of water per day. A mare milking will drink twice that amount. Horses that are exercising during hot weather may drink 30 to 40 gallons per day. So this is extremely important to your horse's health; keep plenty of clean water available.

Minerals that are lost in sweat are called electrolytes. These include sodium, chloride, potassium, calcium, and magnesium. These electrolytes are important in regulating fluid exchange as well as in nerve and muscle function. Electrolyte deficiencies or imbalances can certainly affect performance and general health as well.

So how do we feed and manage a performance horse in hot weather?

Research has shown that horses should be maintained for best performance at a Body Score of 5 regardless of the time of year. Anything below this will cause a horse to decrease performance. Anything above this can cause a problem with heat dissipation. So we have an optimum body condition that we should monitor and maintain. It is also important to monitor body weight. One may use a scale or a formula to calculate weight. (*For details on Body Condition scoring and calculating horse weight, see www.nutrenaworld.com*).

We need to start with a good diet that is appropriate for hot weather. To understand this, one should first consider the ingredient composition of the diet and how it relates to performance in hot weather. Horses must have energy (caloric intake) to maintain and to perform work. There are four dietary sources of energy; soluble carbohydrates (starch and sugar) as are found in cereal grains and molasses, fiber, fat, and protein. Protein is not a good source of energy as it causes more heat to be given off as it is metabolized. Horses are designed to eat fiber. Fiber is obtained from hay, pasture and the concentrate portion of the diet. There is also more heat given off by fiber digestion than with soluble carbohydrates or fat. Fiber must be present in the diet, as digestive

problems can result if not in fed adequate amounts. We can lower the amount of heat that is produced by the fermentation of fiber by selecting high quality fiber and restricting fiber intake to 0.75% to 1% of body weight. Research has also shown that horses can utilize fat very efficiently. Fat is used during aerobic metabolism, which occurs at a heart rate below 150 beats per minute. Fiber is also used during aerobic metabolism, except heat is a by-product of the fermentation necessary to digest fiber.

To sum up management of a horse in hot weather, the following are recommended practices:

1. Try to dodge the hot times of day if possible, when exercising your horse.
2. Do not feed within three hours before or after exercise.
3. Feed a balanced diet with added fat.
4. Restrict hay intake to 1% of body weight.
5. Do not feed a high protein diet.
6. Maintain a body score of 5 – a score higher causes heat dissipation difficulties.
7. Keep your horse physically fit. Don't exceed a horse's level of fitness – it takes about three weeks for a horse to develop fitness and exercise should be increased gradually.
8. Water your horse frequently during a break in activities. It is a mistake to withhold water. Allow a horse to drink 1-2 gallons at a time and then offer water again in 15 minutes.
9. Spray your horse with water to assist in cooling.
10. Fans, especially water-cooled fans are very effective.
11. Salt should be available on a daily free choice basis preferably in the loose form in a stall or paddock.
12. Horses can be trained to drink water with electrolytes; there are also some paste electrolyte mixtures that can be given orally. Offer water with and without electrolytes; one can stop a horse from drinking by offering different-tasting water.
13. It is a good idea to take your horse's temperature with a rectal thermometer. Normal is 99-100 degrees. You should also learn to take the pulse (40 bmp) and respiration (20 per minute). It is not unusual to see the heart rate and respiratory rate exceed 100 per minute. These vital signs are important, particularly when exercising at high temperatures. A normal horse will recover in 20-30 minutes following exercise.
14. Should a horse not recover in a prompt fashion, one should seek veterinary attention.

A feed that is ideally suited for horses performing in very hot weather is Nutrena XTN. With its high fat and electrolyte levels, it is ideal for the high performance horse.

