

Endurance Riding – The Stresses

Endurance horses undergo severe stress during the course of a competitive endurance ride. The criteria for determining whether a horse should be allowed to continue to ride ('fit to continue') or not, were described in our recent article '*Endurance Riding*'. These regulations have been developed as a result of worldwide experience with endurance riding and are continuously modified and improved to protect the health and welfare of the competing horses.

The information with which to evaluate a competing endurance horse has to be gathered from a visual assessment of the horse (e.g., general condition, signs of dehydration, hyperthermia (overheating), soreness and lameness) and its heart rate and respiratory rate with heart rate and respiratory being the only two objective measurements usually taken. Unfortunately, because of the timing of when these measurements are taken, they only provide information of 'how the horse has recovered from the ride'. In terms of horse management during a competition and designing a specific training program, information of the stresses involved *during* the competitive ride would be extremely useful. This type of information is becoming more and more readily available as equine scientists use the latest technology to gather and analyze this data. Some examples of this type of data or information follow.

Example 1

In 1993, Dr Chris Pollitt of The University of Queensland, published a series of outstanding articles titled '*Monitoring the Heart Rates of Endurance Horses*' in the equine journal **The Equine Athlete**. By recording and storing the heart rate responses of endurance horses during an entire endurance ride he had hoped to provide some answers to the following questions:

- ❖ How hard do horses get pushed during an endurance ride? Did I push my horse too hard?
- ❖ What was the horse's heart rate during the 2-3 hours of the ride?
- ❖ Is your horse fit enough to complete an endurance ride?
- ❖ Can recording exercising heart rates increase our understanding of endurance horses and help keep their welfare foremost in our minds?
- ❖ Can it help identify a 'useful' endurance horse out of a bunch of also-rans?

Answers to these questions are beginning to emerge as more and more equine scientists gather physiological information from horses during actual competitive endurance events.

In Dr Pollitt's first article, he looks at the relationship between running speed, heart rate response and lactic acid levels in three endurance horses. It is this type of information that may help identify the 'useful' endurance horses from the also-rans.

The first horse, 'Barina', was put on a high-speed treadmill and 'asked' to canter at a speed of approximately 29.0 kph. Just before the 10 minute mark, Barina's heart rate had been steady at about 200 bpm with blood samples indicating a blood lactate level of about 4.0 mM. At the 10-minute mark, blood lactate started to rise rapidly and at the 15-minute mark both blood lactate and heart rate peaked at 10.5 mM and 220 bpm respectively. At this point, fatigue had set in, so the treadmill was stopped but blood sampling and heart rate monitoring was continued. Within 30 minutes of stopping the test, Barina's heart rate had recovered to less than 60 bpm – a remarkable result considering the intensity of the exercise test. In fact, as it turned out, Barina was the only horse of eight tested whose heart rate recovered to less than 60 bpm within 30 minutes of being tested.

The second horse tested, was a part-Arabian gelding, who, at the time of testing, was the champion endurance horse of Australia, having won the 160-km Tom Quilty Australian Championship ride twice in succession. Prince cantered at approximately 37 kph with a heart rate of 185 bpm and blood lactate level of 5.5 mM. After 10 minutes at this speed, blood lactate began to accumulate rapidly, peaking at 11 mM and forcing Prince to fatigue and slow down after cantering for 14 minutes. As with Barina, the treadmill was stopped with heart rate and blood lactate still being monitored. Despite the obvious elite status of Prince, his heart rate was unable to recover to less than 60 bpm within 30 minutes of stopping the test. As stated by Dr Pollitt, even though Prince had consistently rapid heart rate recoveries during normal competition, it would seem the cantering speed of 37 kph was beyond his extraordinary capacity.

The third horse was a completely untrained 7-year-old Arabian gelding ('Khan') that had just come out from spelling. Because of his unfit status, Khan was cantered at a speed of approximately 23 kph. After 10 minutes of work, Khan's heart rate was a relatively low 155 bpm. Khan cantered for 43 minutes before a peak lactate of about 10 mM forced him to slow down. His heart rate failed to recover below 60 bpm within 30 minutes of stopping.

Of the eight horses tested this way, it became obvious that each horse had its own individual 'threshold' of cantering speed beyond which, depending on its level of fitness and training, it accumulated lactic acid, fatigued and slowed down. In summary, an untrained horse such as Khan, had a low speed lactic acid threshold and would be considered inferior to, in competitive endurance riding terms, a horse which required high speed to accumulate high lactate levels.

Conclusions

1. It seems it would be possible to identify a potential competitive endurance horse from a bunch of also-rans by using a test involving the measurement of heart rate and blood lactic acid.

2. It seems it would be possible to identify changes in 'endurance' fitness levels of your horse by using a test involving the measurement of heart rate and blood lactic acid.
3. In terms of competition, it would be valuable to have prior knowledge of how your horse's speed 'threshold' and how it handles lactic acid accumulation. The use of a heart rate monitor, together with blood lactate measurements during training, competition and a specific 'endurance horse' treadmill test would valuable aids in this regard. It is now possible to identify the '*individual maximal steady-state lactate level*' for any endurance horse.
4. Knowledge of your horse's recovery heart rate after periods of sustained high intensity cantering would be extremely valuable when considering your horse's management during competition.