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Understanding the cardiac recovery index

by Paul van Dam

The cardiac recovery index (CRI), often also referred to as the Ridgway test (after its originator), is one of the tools used by veterinarians to determine whether a horse is fit to continue in an endurance race. It is an exercise tolerance test that involves determining the pre-exercise heart rate, followed by trotting the horse in-hand for 80 m, usually 40 m away from the veterinarian and 40 m back.

This usually takes about 28-32 seconds. The trotting is followed by an equivalent period of standing at rest to recover from the exercise. Exactly one minute from commencement of trotting the post exercise heart rate is determined. The CRI is expressed as 64/60, or 48/52 or 44/44, etc.

The essential element is an exercise period of close to 30 seconds, followed by a similar rest and recovery period. Obviously this will not always be the case. The horse can be led at a fast trot, which gives more recovery time after a short, but more strenuous exercise effort, or the horse can be led slowly and the demand upon the body kept to a minimum.

Making use of the CRI

The CRI figure allows riders to compare and assess their horse's progress during an endurance ride in five ways:

- Their own horse's capacity for further exercise
- Their own horse's status in terms of slip time (see article on the gate system elsewhere in this issue)

- When requested by the veterinary panel to represent for a re-examination, it shows whether the horse is progressively recovering during the hold period
- It enables a rider to gauge the status of other horses at each checkpoint, if they are able to obtain the CRI figures of these horses and interpret them in the light of the other horse's slip time
- The CRI test enables a rider to ride his horse strategically, using the exercise tolerance information in conjunction with the slip time. This opportunity for a rider to ride with thought and use scientifically-based strategies, brings to the sport of endurance riding a horse welfare component that is rider driven, yet veterinary monitored.

Interpreting CRI figures

The CRI is an accurate predictor of "capacity to continue". It is not a diagnostic tool, but rather an indicator or warning signal that something is amiss when the second figure is higher than the first. The CRI is least accurate on slow beating horses (< 44 bpm) and on rapidly beating hearts (> 72 bpm). The CRI is most accurate in the heart rate zone 48-72 bpm.

High CRIs

A CRI with a four beat increase needs to be interpreted based on three factors:

- The other physiologic parameters of the veterinary examination
- Consideration of the slip time
- The actual resting heart rate. An increase of four beats (or more), increases in significance as the base (resting) heart rate gets closer to the limit figure of 64 bpm.

A CRI with an eight beat or higher increase, warrants further investigation of the horse's metabolic and pain status before a decision as to whether the horse can continue or not, is made. This will often include a re-examination approximately ten minutes before the horse is to depart on the next leg.

Level CRIs

The reading 64/64 or 48/48 means that the horse was quite capable of passing a simple exercise tolerance test. Level CRIs are more significant at heart rates of 56-64 bpm than 40-52 for the simple reason being that horses with the latter heart rates are not under significant exercise induced stress in any case. Level CRIs are an indication that the horse is coping with the current demands/speed expected of him.

Low CRIs

Where the second figure is lower than the first figure (for example 56/52), it means that the horse has sufficient oxygen in its muscles, little to no lactic acid in its circulation and is not overheated in a major way. The exercise test was not only insignificant, but it also shows that the horse is recovering in a normal way despite being subjected to the test. A low CRI means that there is considerable capacity or "fitness to continue".

An evaluation tool

The CRI is not the be all and end all of evaluating a horse. It is just another tool that can be used by the veterinarian to determine whether it is safe for the horse to continue. The test does show whether the horse still has reserve capacity or is close to exhaustion, and often also whether there is some condition (one that is not yet obvious) causing the horse pain. However, some seasoned endurance horses can return a level CRI test, while the other metabolic parameters indicate that they are metabolically unstable.

The judgment of "fit to continue" made by an endurance veterinarian, is never based on the CRI alone, but always on all physiological information available to him. It requires a trained brain to collate all the information and make a decision – hence the necessity to involve experienced veterinarians in all endurance rides. **DR**