

Exercise testing in horses

South Eastern Equine Hospital is now able to provide exercise testing on the treadmill. This test involves continuous heart rate monitoring and electrocardiography, as well as continuous endoscopy of the larynx (throat) while the horse is exercising at increasing speeds on the treadmill. We also perform blood lactate measurements which help to assess fitness.

Which horses would be suitable for an exercise test?

Exercise testing is an appropriate test for all disciplines in which some fitness is required. This includes Thoroughbred and Standardbred racehorses, as well as endurance horses, eventing horses, showjumpers and dressage horses. An exercise test is able to evaluate the heart rate and rhythm as well as the upper airway and provides information about oxygen delivery and utilisation.

What extra information is obtained in an exercise test compared to a resting examination?

Many conditions can limit exercise capacity and performance, without affecting the health of the horse at rest. **Upper airway conditions** affecting the pharynx and larynx are dynamic, meaning that the functional capacity of the larynx will change depending on the increased airway pressures that occur during exercise. We sometimes find that airway abnormalities that look concerning at rest are actually sufficient during exercise, but often horses that look normal at rest can have dynamic airway abnormality. Such dynamic airway abnormalities include laryngeal hemiplegia, pharyngeal collapse, palatal instability, dorsal displacement of the soft palate, epiglottic abnormalities, axial deviation of the aryepiglottic folds and vocal cord collapse. **Cardiac rhythm abnormalities** are often only able to be diagnosed through continuous electrocardiography (ECG) monitoring during exercise. Since many cardiac arrhythmias are not present at rest, they are easily overlooked as a cause of poor performance. Interestingly, recent studies have shown that cardiac arrhythmias often occur alongside airway conditions such as upper and lower airway disease and exercise induced pulmonary haemorrhage. An exercise test can also be recommended in horses that have heart murmurs and valvular regurgitation. In these cases, an exercise test is essential to understand the impact of these various conditions on performance and safety.

What about horses with a history of weakness or collapse?

Exercise testing on the treadmill can be particularly helpful in horses with a previous episode of weakness, stumbling or collapse during or shortly after exercise. Riders and jockeys can be injured when a horse falls during exercise, therefore exercise testing in the treadmill can be an important step to assess the horse before ridden exercise is resumed.

What equipment is needed?

An exercise test is performed on a treadmill, reaching speeds of up to 45 kph, often with an incline of 2-5 degrees (Figure 1). Many racehorses are used to being exercised on a treadmill and will be comfortable with this procedure. However, horses unfamiliar with exercise on the treadmill will

require several training sessions prior to the exercise test. An ECG is put on the horse, in a surcingle (Figure 2). This is comfortable for the horse to wear and can also be used during ridden exercise tests. The ECG records both the heart rate (Figure 3) and rhythm (Figures 4 and 5) during exercise and allows for the diagnosis of an abnormal rhythm. Heart rate can also be used to assess fitness with the V200 being the velocity at a heart rate of 200 beats per minute. Other measures of fitness and exercise capacity include VHRMax (Velocity at maximal heart rate) and VLa4 (Velocity at lactate of 4 mmol/L). Lactate in the blood can be easily measured as the horse exercises on the treadmill with placement of a catheter in the jugular vein, which allows for immediate measurement of lactate with a handheld monitor. As a horse gets fitter the speed at which the horse reaches HR 200, HR Max and La4 will increase. These calculations can also help to differentiate elevated heart rate due to pain (possibly associated with lameness) in which V200 will be reduced and VLa4 normal, from cardiorespiratory disease, in which both V200 and VLa4 will be reduced.

Figure 1. High speed treadmill in use at South Eastern Equine Hospital.



Figure 2. Horse on a treadmill wearing an exercising ECG.



Figure 3. Heart rate (shown in blue) and speed (shown in red) for a horse undertaking an exercise test on the racetrack. As speed increases, heart rate also increases. This horse reached a peak speed of 18 metres per second (65 kph) and a peak heart rate of 210 beats per minute. It can be seen that the heart rate drops rapidly after exercise and this can be a vulnerable time for arrhythmias.

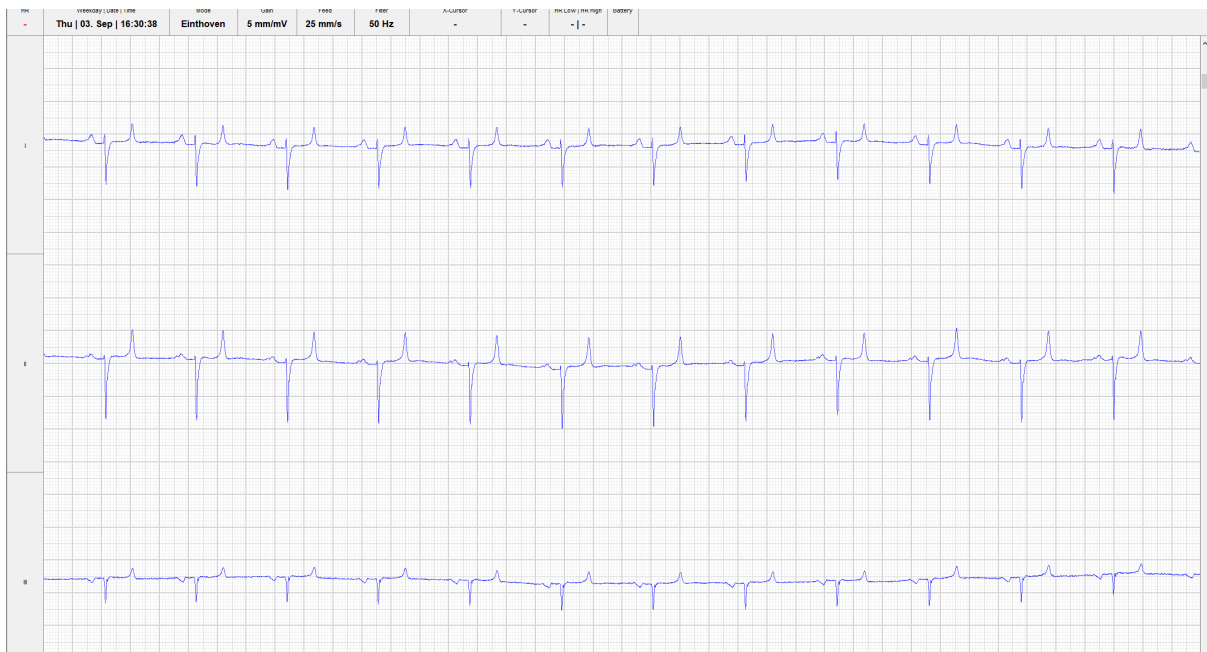


Figure 4. Normal resting sinus rhythm ECG.



Figure 5. Irregular heart rhythm seen during an exercise test.

In addition to heart rate and rhythm assessment and lactate measurement, endoscopy of the upper airway provides important information. This is done by placing a small endoscope up the nostril of the horse and keeping it in place throughout the test (Figure 6). This can have an advantage over the dynamic scope (performed under saddle) as the operators have access to the scope throughout exercise and can move the endoscope to visualise different areas of the upper airway and can place the scope correctly if it moves out of place during the examination.

How will this information benefit my horse?

The information obtained during the exercise test can be used to understand fitness and exercise capacity and can help to modify training programs or decide when a horse is fit enough to compete. The information can also be used to determine the cause of poor performance or a decline in performance or exercise capacity. Combining the information about the heart and airway can help to better understand what might be limiting oxygen delivery or utilisation and how this can be managed. Some upper airway conditions can be managed with changes to tack, medical treatments and sometimes surgery. Cardiac abnormalities can have important impacts on safety, but mild abnormalities can sometimes be managed with modifications to training programs, electrolyte supplementation, anti-inflammatories and rest.