

## Measuring Your Horse's Fitness

### V<sub>200</sub> Test

#### Part II

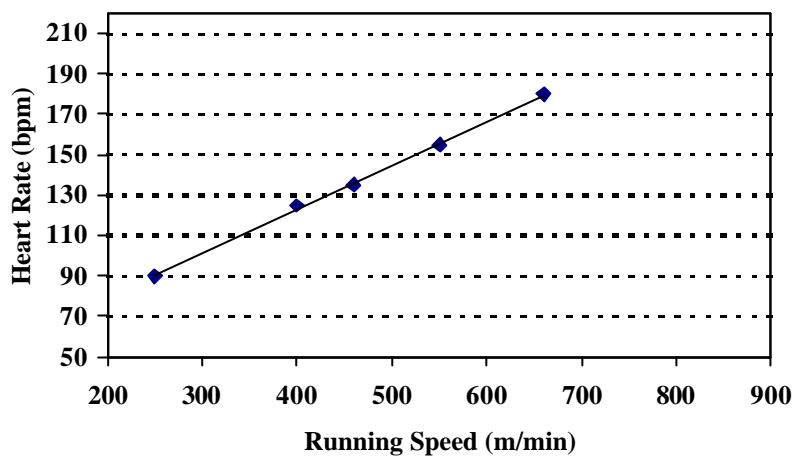
In Part I of this article, we described some of the advantages of being able to ‘get a measure’ of your horse’s fitness level during any stage of its training program. In particular we mentioned a test called the ‘V<sub>200</sub> Test’, a test that defines the running speed of your horse when its heart rate is 200 bpm. Whilst this test can be conducted on a high-speed treadmill, it can just as easily be conducted in the field. Recently, Japanese equine scientists provided information on conducting a V<sub>200</sub> Test in the field and looked at the effect of rider weight, track surface and horse fitness level on V<sub>200</sub> values. The study and its findings are provided below.

#### How The Test Was Conducted

The V<sub>200</sub> Test was conducted on 112 2-year-old Thoroughbreds over a 4-year period using 4 different training centers. All tests were conducted on firm sand tracks under mild environmental conditions (~ 17 degrees Celsius). The test consisted of a 10-minute warm-up at a walk and slow trot followed by 5 stages:

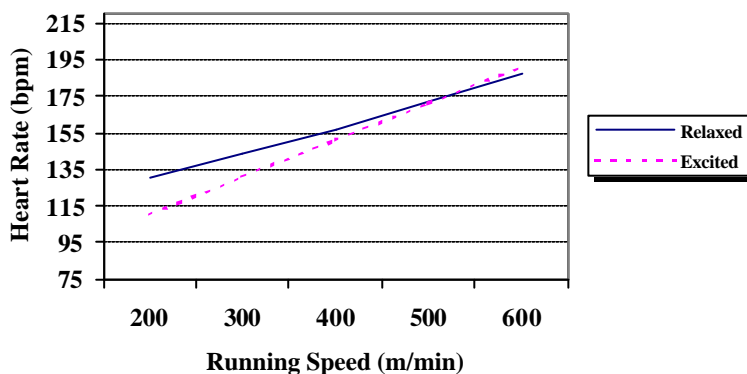
1. A trot at about 250 m/min or 48 s per furlong producing a heart rate of approximately 90 bpm
2. A canter at about 400 m/min or 30 s per furlong producing a heart rate of approximately 125 bpm
3. A canter at about 460 m/min or 26 s per furlong producing a heart rate of approximately 135 bpm
4. A slow gallop at about 550 m/min or 22 s per furlong producing a heart rate of approximately 155 bpm and
5. A slow to fast gallop at about 660 m/min or 18 s per furlong producing a heart rate of approximately 180 bpm

The horse was worked over approximately 800 m for each of the 5 stages with heart rate being measured by a POLAR Horse heart rate monitor. No information was given regarding the rest period between each stage, but it was probably the time taken to walk the horse back to the starting point for the next stage. At the end of each test, the horse’s heart rate was downloaded to a computer and the heart rate versus speed relationship was calculated. V<sub>200</sub> was determined by a mathematical calculation called ‘linear regression analysis’ between heart rate and running speed. A typical graph with a ‘line of best fit’ is shown in Figure 3.



**Figure 3 ‘Line of best fit’ of heart rate and velocity in one horse under field conditions. Predicted  $V_{200}$  was 770 m/min or 15.6 s per furlong**

In order to get good test results it was imperative that the horses were exercised smoothly through gait changes and acceleration, and were kept relaxed. Figure 4 shows the difference in a horse’s heart rate response when exercised in relaxed and excited states.



**Figure 4 Heart rate response of one horse after completing the test in (1) a relaxed state and (2) an excitable state.**

The difference in the fitness test score is significant with  $V_{200}$ ’s being 643 m/min and 692 m/min respectively for the excited and relaxed condition of the horse. The take home message here is to make sure your horse is familiar with the surroundings and the field test protocol before actually completing the ‘real thing’.

### **What Variables Were Examined?**

In order to study  $V_{200}$  under field conditions, the following items were examined:

1. Influence of the rider: In order to study the influence of changes in rider's weight to  $V_{200}$ , 10 horses were used and  $V_{200}$  was measured for 2 consecutive days. All horses were randomly assigned the lighter and heavier bodyweight riders.
2. Influence of the track: In order to study the influence of different kinds of running track on  $V_{200}$ , 5 horses were used for 10 consecutive days on 3 surfaces; grass, woodchip and sand. The  $V_{200}$  were obtained for each of the tracks.
3. Reproducibility of  $V_{200}$ : Reproducibility provides an answer to the question 'If I test a horse today and again 2 days later under similar conditions, do I get the same result?' In order to study the reproducibility of  $V_{200}$ , 31 horses were used and  $V_{200}$  measured for 2 consecutive days. Measurements were made under similar conditions, including the same riders and running track.
4. Effect of training program: The  $V_{200}$  were measured at one month intervals at the 4 training centers using 112 horses over a 5 month period.

### **And What Were The Results?**

The following results were obtained from the study and are worth noting for anyone wishing to use the  $V_{200}$  field test.

#### **Influence Of The Rider**

The weight difference in the riders used was approximately 15 kg. When the light rider was used the average  $V_{200}$  for the 10 horses was 696 m/min (17.2 s per furlong) and when ridden by the heavy rider  $V_{200}$  decreased to 661 m/min (18.1 s per furlong). Although the statistics used in the study showed this difference was insignificant, *it would be recommended to use the same rider (or same weight of rider) when retesting your horse.*

#### **Influence Of Track Surface**

Results showed that there was no difference in  $V_{200}$  scores when the horses were tested on either grass or woodchip. However, there was a difference in the  $V_{200}$  scores when comparing grass and sand (695 m/min V's 608 m/min or 17.3 s per furlong V's 19.8 s per furlong). Once again, *it is recommended to keep the running surface standardized when retesting your horse.*

#### **Reproducibility Of $V_{200}$**

Provided the horse is familiar with the test and standardized conditions are used (e.g., same weight of rider, same track surface) the  $V_{200}$  is very reproducible.

### **Effect Of Training Program**

In the horses that completed the 5 months of training,  $V_{200}$  increased as time progressed. From month 1 to month 5,  $V_{200}$  increased an average of 10% and the maximum was 23%. *Hence, the  $V_{200}$  Test is able to pick up changes in your horses fitness with the appropriate training.*

### **Summary**

It would seem that the  $V_{200}$  Test can be conducted easily, that it is useful in evaluating training effect and it can be used easily in the field provided the following conditions occurs:

- ❖ You have access to an accurate and reliable horse heart rate monitor (e.g., POLAR Horse Trainer) and stopwatch.
- ❖ You have a relatively flat 600-800 m track with a grass, woodchip or sand surface. The track would have to be free of any sharp cornering.
- ❖ You test / retest the horse under similar conditions each time, e.g., temperature, time of day, time after feeding, weight of rider, same track.
- ❖ Before conducting the first test, give you horse a 'trial run' so that it is familiar with the task conditions involved.

**Part III:** A step-by-step approach on conducting a  $V_{200}$  Test on a Thoroughbred, Standardbred and Endurance horse in the field and a demonstration on how to calculate  $V_{200}$ .