

# A COMPARISON OF DIFFERENT STANDARDIZED EXERCISE TESTS (SET) FOR ASSESSING FITNESS ON A HIGH SPEED TREADMILL

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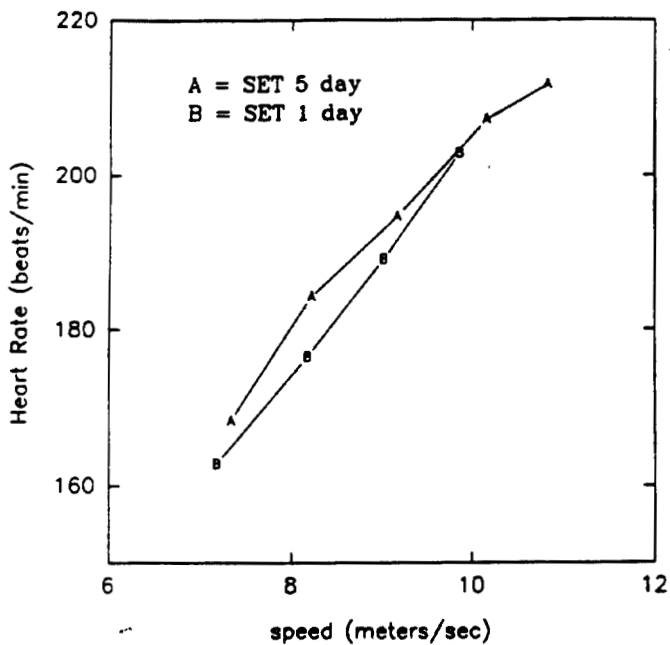
## *Materials and Methods*

Six Thoroughbred racehorses were used to evaluate two different types of standardized exercise tests (SET) on a 6' inclined high speed treadmill. The first test (SET1) was a one day test which consisted of a 2 minute warm-up walk and sequential steps of 1/2 mile at speeds of about 4, 7, 8, 9, and 10 m/s. The horses were fitted with indwelling catheters and venous blood samples were collected at rest and at the end of each speed and analyzed for lactic acid. The horses also wore on-board heart rate monitors and heart rate was continually recorded throughout the exercise period. The second exercise test (SET5) took place over a five day period. Each day, the horses warmed up for 2 minutes at a walk, 4 minutes at a trot (~4.25 m/sec) and then galloped at a fixed speed for 1 mile. At the end of the 1 mile run the horses were warmed down at a trot for 4 minutes and a walk for 1 minute. Heart rate was monitored throughout exercise and blood samples were taken both at the end of the 1 mile run (OP) and at the end of the 5 minute warm-down (5P). This test was repeated with each horse running at a different speed each day over 5 consecutive days so that speeds of ~7, 8, 9, 10 and 11 m/s were measured.

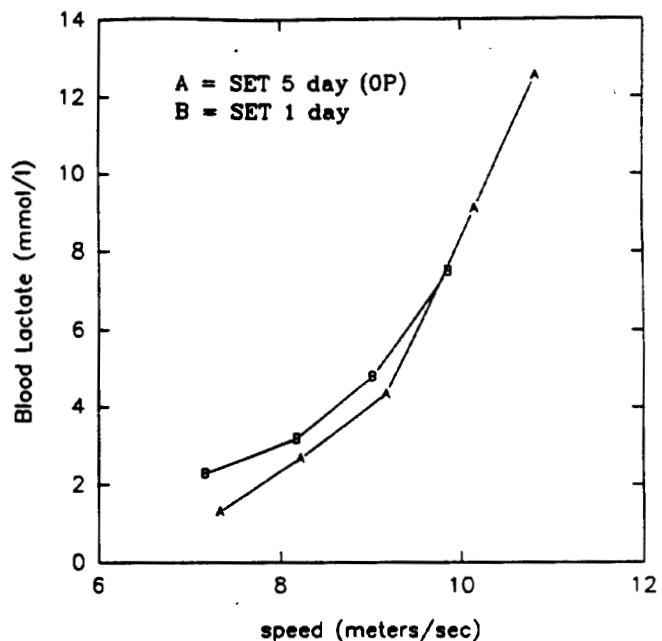
The heart rate-velocity relationship was determined by linear regression of heart rate during the last 15 sec. of each step on speed and was expressed as  $V_{180}$  and  $V_{200}$ . The lactate-velocity relationship was determined by regressing the logarithm of lactate against speed and was expressed as  $V_{LA2}$ ,  $V_{LAM}$ , and  $V_{LAS}$ . During SET5,  $V_{LA2}$ ,  $V_{LAM}$ , and  $V_{LAS}$  were determined using blood samples taken at the end of exercise (OP) and after 5 minute warm down (5P).

## *Results and Discussion*

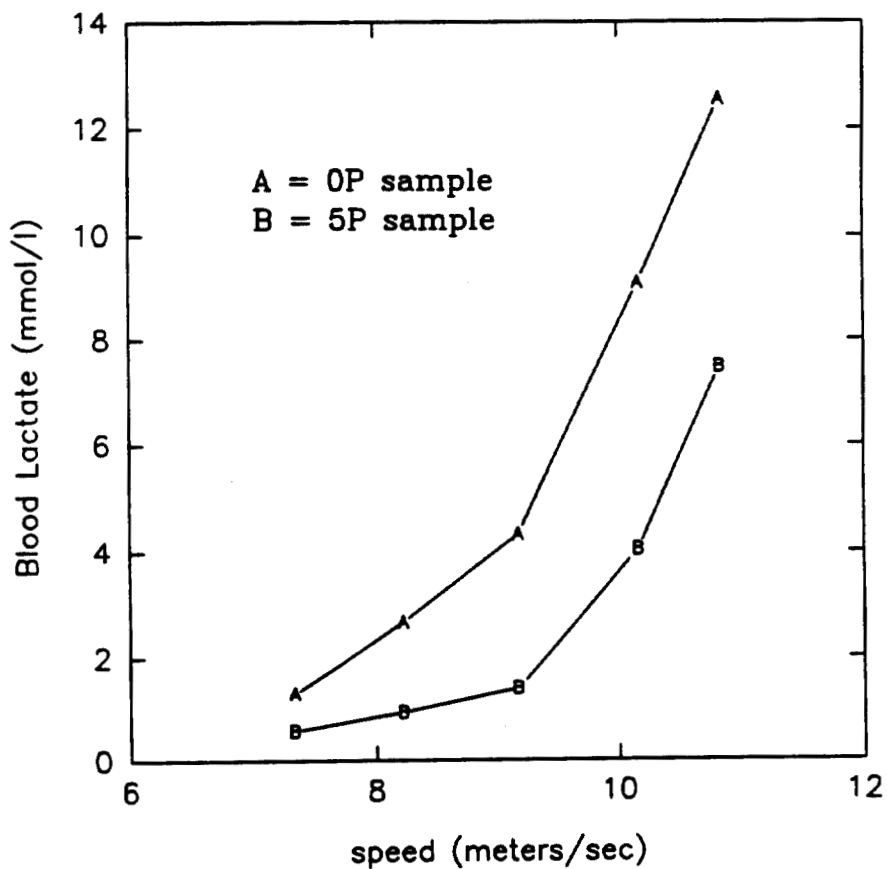
$V_{180}$  and  $V_{200}$  were higher in SET1 (8.32 and 9.81 m/s) than SET5 (8.07 and 9.70 m/s)(figure 1).  $V_{LA2}$  and  $V_{LAM}$  were higher during SET5 (7.92 and 9.0 m/s) than during SET1 (6.74 and 8.52 m/s), but  $V_{LAS}$  was lower in SET5 (10.06 m/s) than SET1 (10.29 m/s)(figure 2). Lactic acid levels (figure 3) were significantly lower after the 5 minute warm-down (5P) during SET5 than immediately after exercise (OP). 5P lactate averaged only 48% of OP levels. This study demonstrates that the type of SET design affects the heart rate and lactate response to exercise at the same speed. Sequential steps of short duration measure the speed with which aerobic metabolism can increase in response to an increase in exercise intensity while single steps of longer duration give a truer indication of the overall contribution that anaerobic metabolism makes to energy generation at a specific speed. Blood lactic acid dropped dramatically during the warm-down segment of SET5 which is contrary to other studies of lactate kinetics following exercise. More research is needed to explore this relationship.



**Figure 1.**  
Heart rate response during SET1 and SET5



**Figure 2.**  
Lactate production during SET5 and SET1



**Figure 3.** Blood lactate immediately after exercise (OP) and at the end of a 5 minute warm-down (5P)