

Evaluation of Factors Influencing the Performance of Four Equine Heart Rate Meters

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Summary

Although digital display meters are used to measure heart rate during exercise, their accuracy has only recently been examined. The objectives of the present study was to assess factors influencing the accuracy and practical application of four meters designed for use in the horse. Meter output was compared with an ECG reference signal. The study used three Thoroughbred horses working maximally in a step-wise test on a high speed treadmill. Reference signal rate ranged from 60 to 220 beats per minute (bpm). Output of three meters (PEH 100, H/R-7, and PEH 200) showed a good correlation with reference signal ($r > 0.94$; unadjusted, and $r > 0.98$, adjusted data), while the fourth unit (TTJ) showed a poorer correlation ($r = 0.54$). Mean difference and variance between reference and meter observations for pooled data was small for the first three meters. Mean difference and variance for TTJ were large. Non-random error was concentrated in particular stages of the test for each meter. This appeared to reflect influence of gait on noise generation, and meter competency in handling a noisy signal, and occurred mainly in the trot, gallop and recovery phases. Performance of PEH 100, H/R-7, and PEH 200, is adequate for field applications. PEH 200 and H/R-7 also appear to be suitable for experimental applications.

Index terms: Racehorse; exercise physiology; sports medicine, ECG.

Introduction

Heart rate meters are non-invasive devices used to monitor heart rate during exercise. Their applications include monitoring of the acute response to exercise and of the adaptive response to training, and the monitoring of cardiac response to exercise during research studies (Isler *et al.*, 1982; Wilson *et al.*, 1983; Foreman, 1984; Physick-Sheard, 1985; Evans and Rose, 1986). Despite their increasing use, the performance of heart rate meters has been the subject of only limited study (Foreman and Rabin, 1984), while the potential error associated with their use has only recently been examined